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Vol. 53, No. 10

Dental Digest

OCTOBER 1947

About Our

CONTRIBUTORS

GREGORY B. SALISBURY, D.D.S. (Temple University, School of Dentistry, 1934) has become identified with clinical research in dental acrylics through numerous reports in the literature, which are quoted by authorities in their textbooks, and through presentations before dental societies. In this issue he brings readers up to date on DIRECT ACRYLICS IN RESTORATIVE DENTISTRY. Doctor Salisbury is a general practitioner. His special interest is jacket crown restorations.

DOCTOR MITCHEL's discussion includes original findings of the various physical reactions of investments in the process of vacuum investing. The technique used in the method of reproducing an accurate wax pattern is also given. Results of time-consuming tests carried out by co-author Mr. Robert Neiman, B.S., M.S., are presented in graph form. Last month Doctor Mitchel described THE USE OF AN OCCLUSAL MATRIX IN WAX PATTERN FABRICATION.

HAROLD K. BOX, D.D.S., Ph.D., is a research professor of periodontology on the Faculty of Dentistry, University of Toronto. His article entitled NEW ASPECTS OF PERIODONTAL RESEARCH is reprinted from the January 1947 issue of *The Journal of the Canadian Dental Association*. It is a well-documented review of the literature on the production of periodontal disease and includes also some new aspects of research in periodontology.

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DIRECT ACRYLICS

*in Restorative Dentistry**

GREGORY B. SALISBURY, D.D.S., Philadelphia

DIGEST

To the extensive uses for direct acrylics in restorative dentistry previously reported are added here: immediate acrylic jacket crowns for temporary use and restoration of incisal corners.

The procedures employed for these two types of restorations are similar. Addition of acetone to the monomer prevents spreading or splitting of the celluloid forms by making the mass more compressible. Dentists are cautioned not to apply alcohol to acrylic jacket crowns; it attacks methyl methacrylate, marring the texture of the finished product and dehydrating it.

Successful results with direct acrylic restorations and with acrylic inlays are reported and the solution of two problems with acrylic inlays is described.

The principle successfully applied to posterior fixed bridges is utilized in a new design for anterior bridge construction. The technique provides for individual replacement of broken acrylic pontics which are retained in hollow mesh tubes in the framework of the bridge.

Restorative Material

THERE IS a universal demand for a new tooth restorative material to meet the shortcomings of the ones in use today. The original research findings on dental acrylics as permanent restorations were presented in Boston in 1942 before the New England Dental Convention. These findings were based on experiments carried out since denture acrylics were first used early in 1939. Fine mesh polymer later replaced the denture polymer utilized at that time.

Since 1942 a number of reports have appeared in this country on the use of dental acrylics for direct insertion in cavities. A series by Salisbury¹ was followed by reports of Slack,² Nover,³ and Glen.⁴

Hardening Agents—The greatest stumbling block has been the slow hardening of the acrylic. A sandy mix, as originally recommended, avoids this problem but produces a coarser texture. Various hardening agents have been tried, such as melamine anhydride, benzoyl peroxide, and many others. The results were only fair. Infra-red and ultraviolet were tried. Incorporation of crushed

glass, glass fiber, and silicon into the methyl methacrylate was tried in order to secure more rapid hardening.

Experimentation by Germans—The report by Major General Norman T. Kirk, Surgeon General of the Army, that Germany had developed a successful direct acrylic during war years aroused interest in the dental profession in this country. In his report⁵ General Kirk made the following statement: "The substance was used in a quick-hardening plastic state in prepared cavities. Development of the material was halted in Germany during the war by the destruction of the factory in 1943 but had already been used experimentally at that time. Fillings inserted in 1943 were found in excellent condition in 1945."

Correspondence with the dental officer in charge of the investigations⁶ informed me that "the material was an ordinary acrylic resin with a hastener which was referred to as a tertiary amine and which caused the material to set in from ten to fifteen minutes. An infra-red lamp was sometimes used to speed hardening. It was not put on the open market but was given to a limited number of dentists for testing. I saw fillings which were placed for company employees in 1943 and which were still in good condition, though the Class II fillings appeared to be poorly trimmed." The last observation, needless to state, is due to the improper finishing of the restorations.

I was informed by this same source that samples of the product were sent

¹Salisbury, G. B.: (a) Application of Methyl Methacrylate to the Tooth: Cured at Mouth Temperature, *DENTAL DIGEST* 49:14-17 (January) 1943; (b) Polymerization of Individual Direct Acrylic Restorations, *ibid.* 49:60-66 (February) 1943; (c) Direct Acrylic Restorations, *ibid.* 49:110-114 (March) 1943; (d) Suggestions for Improved Direct Technique for Methyl Methacrylate, *ibid.* 49:261 (June) 1943; (e) Improved Direct Acrylic Restorations, *ibid.* 50:356-357 (August) 1944; (f) Modern Trends in Dental Acrylics, *ibid.* 51:196-201 (April) 1945.

²Slack, F. A., Jr.: Present Research Status of Direct Acrylic Restorations, *J.A.D.A.* 30:1233-1238 (August) 1943.

³Nover, P. P.: Direct Acrylic Restorations, *DENTAL DIGEST* 50:161-163 (April) 1944.

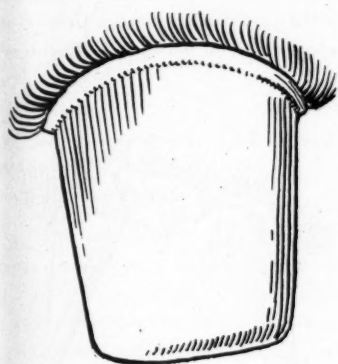
⁴Glen, J. H.: Filcyl: An Acrylic Resin for Immediate Insertion, *Dental Gazette*, 11:349-352 (April) 1945.

⁵General News: German Dentists Used Plastic Base for Permanent Fillings, *J.A.D.A.* 34:126 (January 15) 1947.

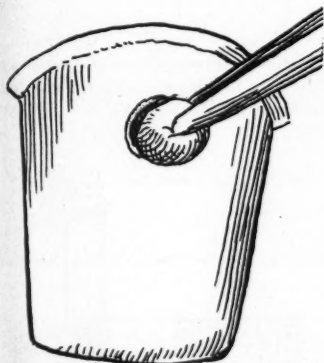
⁶Personal communication to the author from Lieutenant Colonel George F. Jeffcott (DC) AUS, Office of the Surgeon General, War Department.

*Presented before O. H. Caver Seminar, Baltimore College of Dental Surgery, University of Maryland, Baltimore, May 16, 1947.

to the United States Department of Commerce and that testing of the material was in progress; also, that "the commercial importance of the findings is considerable." The procedure is a tremendous and epochal step forward and may revolutionize all of our present operative techniques and materials.



1. Tooth prepared for temporary acrylic jacket crown.



2. Stump coated with cavity lining.



3. Celluloid form fitted.

Immediate Acrylic Jacket Crowns

Since the last report on direct acrylics in April 1945,¹ the only new technique produced in the experimental laboratory has been one for immediate acrylic jacket crowns for temporary use. (Some of these jacket crowns, incidentally, are serving well as permanent restorations under observation.) A similar procedure is likewise employed in building up incisal corners. Difficulty is encountered in filling celluloid forms or corners; under compression, the celluloid gives and spreads or splits.

1. To overcome this, one drop of acetone may be added to ten drops of monomer (Fig. 4).

2. Polymer is added in quantity sufficient to absorb the liquid, or the liquid is mixed with powder, as in preparing silicate restorations (Fig. 5). The mass is then covered with a clear dappen dish (Fig. 6) until a tacky consistency is reached.

3. The acrylic mass is packed into the celluloid form or corner and forced into place (Fig. 7). Addition of acetone makes the mass more workable and allows for better compression without the fear of destroying the celluloid.

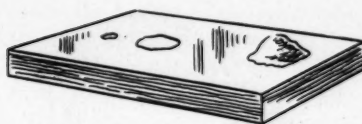
(If, for experimental purposes, you wish to retain the acrylic direct jacket, peel or disc off the celluloid a week later. Polish with vaselined discs and wheels at low speeds.)

Incisal Corner Restorations

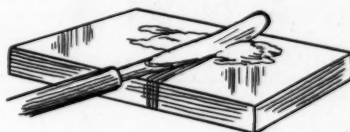
The procedure for incisal corner restorations is the same as that for immediate acrylic jacket crowns.

1. A celluloid form is selected to fit the case. The opposite corner is slit to allow passing over the contact point, if that is necessary. If possible, a complete form should be used and passed through the contact point by the use of separation; thus the strength of the form is utilized and displacement during the hardening stage is prevented in patients who are careless or uncooperative.

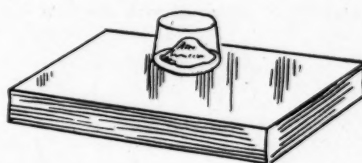
2. The form receives acrylic only on the side that is being restored. The cavity is packed with acrylic but not



4. To increase compressibility of acrylic mass, pour ten drops of monomer, one drop of acetone, and add desired shade of polymer.



5. Incorporate powder into liquid until moist mixture is secured.



6. Place clear dappen dish over mix until it is tacky.



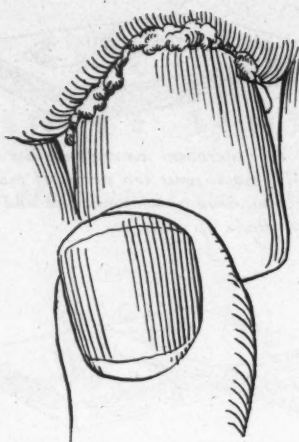
7. Pack into the celluloid form.

to an excess. The form is then slipped over the tooth and acrylic compressed into the cavity. The excess flows into the remainder of the form and aids in retention of the celluloid.

3. Check the occlusion and trim off the gross excess.

4. Hold in position for three minutes (Fig. 8), while applying heat with the warmed air syringe.

5. Expose to infra-red radiation for



8. Force filled form onto the stump after occlusion has been checked by having patient close mouth momentarily. Hold form steady for three minutes while spraying with warmed air.



9. Expose to infra-red lamp for ten minutes, if possible, for faster hardening and better results.

ten minutes (Fig. 9) prior to dismissing the patient (optional).

6. Warn the patient not to eat for several hours and to avoid incisal action on the restored tooth until the next day.

7. Finish the case in forty-eight hours by discing off the celluloid and polishing the restoration in the usual fashion under lubrication.

Acrylic Inlays

One should report excellence of gingival or cervical inlays; they are holding up beautifully. Incisal inlays

have shown some wear. Acrylic veneered incisal gold inlays are holding up well. Color of the acrylic presented a problem until the following procedure was carried out:

1. The gold casting was pickled but not polished where it was in contact with the acrylic veneer; this step prevented gold from showing through.

2. Opaque lining over the gold further eliminated the alteration of color of the acrylic.

Mesioclusal acrylic inlays on the upper first bicusps, a common place for this type of restoration on account of the esthetics, have been a problem. Failures were eliminated, however, by adapting a Williams wax reinforcement mesh over the pulpal walls and casting the mesh in hard gold. This is pickled, placed on the model, and the wax-up completed over it. When the case is processed, the cementation problem is removed as the gold mesh foundation allows excellent cementation. So far no inlays have loosened in the most difficult of selected cases.

Processing Acrylic Jacket Crowns

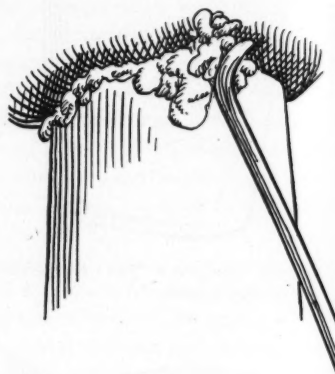
In processing acrylic jacket crowns, one must stress the importance of using a thin, copper-plated die as a model. Thinness makes removal of the copper easy, once the case is processed. The jacket must be cured and finished on the die in order to avoid distortion and misfit. Removal of foiled patterns from amalgam or other dies invites a spread at the gingiva and many other glaring failures. Use of a mix of half stone and half plaster inside foiled dies is likewise not advisable. Many dentists further jeopardize the accuracy of the restoration by using a green investment instead of allowing plaster and stone mix to harden overnight. Thus, alluvial changes in the stone, plus the exothermic reaction produced during the processing, diminish the accuracy of the restoration still further.

When the jacket is finished, it should be immersed in water up to the cementation time; then tested for fit and occlusion so as not to disturb cementation by the vibration of stones in grinding. The inside of the

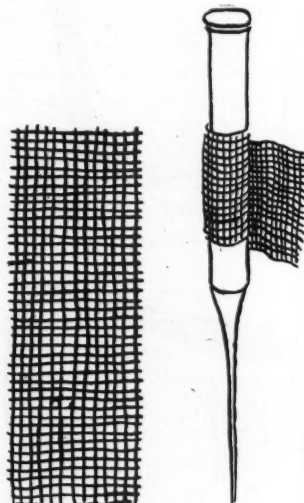
jacket should be wiped with hydrogen peroxide and dried well with cotton. The use of alcohol is prohibitive; it attacks methyl methacrylate, marring the texture of the finished product, and dehydrates it, destroying the cementation.

New Design for Anterior Bridge

(The designs previously introduced to the profession in the article on reinforcement of acrylic fixed bridges¹



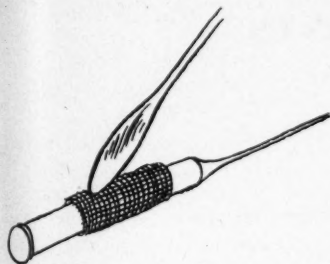
10. Gently remove excess. Caution patient not to bite heavily on the tooth for twenty-four hours.



11. Williams wax retention mesh cut to proper height.

12. Wax retention mesh wrapped around handle of root canal instrument to form hollow tube.

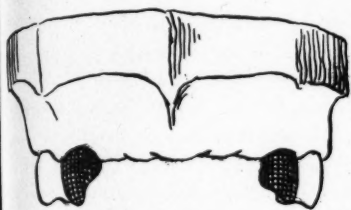
have been favorably received.⁷ A new design for the anterior bridge, utilizing the principle tried out so successfully in the posterior areas, is offered here.



13. Seal mesh with hot spatula containing sticky wax.

1. Wax up a saddle between abutments (which may be either thimble or three-quarter crowns). The saddle is made from a flattened wax wire about three millimeters wide (Fig. 11).

2. Build mesh tubes and wax them up to the saddle in the position of an-



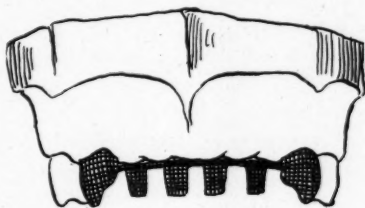
14. Gold mesh thimbles on cuspids.



15. Three millimeter flat wax wire used as saddle between thimbles.

terior tooth stumps (Fig. 14). (These tubes are made by wrapping Williams wax reinforcement mesh around a root canal instrument handle so as to form a hollow tube [Figs. 12 and 13]. This is cut to the height required.)

3. The saddle and the pontics are now waxed up (Figs. 15 and 16), removed (Fig. 17), and cast in hard gold.



16. Wax thimbles for missing incisors waxed to saddle.

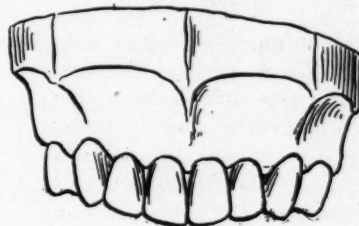
4. Acrylic is processed over this frame (Fig. 18), after it is pickled, tried in the mouth, and soldered to the abutments. (One may save an appointment by waxing up the case first, thus eliminating the try-in, and then trying the entire set-up prior to processing it in acrylic.)

The best feature of this technique is that in case an acrylic pontic

breaks, the hollow in the mesh tube will retain the acrylic. The unit can be shaped up quickly to the outline of a jacket stump. An impression may be taken for a jacket restoration, or one can be carved up directly on the unit. While the jacket is being proc-



17. Remove saddle and thimbles. Cast in hard gold. Solder to cuspid thimbles.



18. Wax up bridge over mesh reinforcement and process in acrylic.

essed, a temporary one may be placed over the stump. Thus esthetics are preserved, the bridge is not dismantled, and an individual replacement can be achieved at a minimum of cost and embarrassment.

Mesh units, if not polished, afford better results in color-blending than the solid metal copings or tubes which generally interfere with proper color blends. There is likewise a saving in the amount of gold used and in the speed of the technique.

49th and Locust Streets.

Tylman, S. D., and Peyton, F. A.: *Acrylics and Other Dental Resins*, ed. 1, Philadelphia, J. B. Lippincott Company, 1946, pages 65, 84, 195-199, 273, 275. Tylman, S. D.: *Crown and Bridge Prosthesis*, ed. 2, St. Louis, C. V. Mosby Company, 1947, pages 903-904.

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The Effect of VACUUMIZING ON THE PHYSICAL REACTIONS OF INVESTMENTS

K. F. MITCHEL, D.D.S., and ROBERT NEIMAN, B.S., M.S., Pittsburgh

DIGEST

A technique is presented to maintain the formation temperature of the wax pattern during the investing process and the setting of the investment. One variable in casting, wax shrinkage, is thus eliminated and does not require compensation.

Compensation for gold shrinkage is provided for by varying the amount of water used with investment according to the degree of expansion desired, a constant amount of investment being allotted to each type of inlay. The vacuum process has been found to increase the proportion of water to investment necessary. Equipment for vacuum-investing is listed.

This technique for casting gold inlays is directed toward exact reproduction of an accurate wax pattern possessing dimensional stability. A method for achieving such a wax pattern was presented last month.

PREVIOUSLY¹ we discussed the technique for producing a wax pattern that combined dimensional stability with the greatest degree of accuracy it was possible to obtain under clinical conditions. In this article we will provide the technique used clinically to complete the casting of the gold inlay with the greatest possible fidelity in reproduction. This technique was

developed under practical conditions over a period of several years. A correlation with scientific laboratory measurements will be given in so far as data are available.

To produce a gold casting that is an accurate reproduction of the missing tooth structure, a whole set of volumetric changes must be controlled. Some of these can be measured accurately and compensated for accordingly; others so far have defied laboratory measurement and must therefore be compensated for empirically.

Recovering and Maintaining Wax Pattern Accuracy

The problem of variable wax shrinkage has been given consideration by many clinicians. A typical wax expansion and shrinkage curve is shown in Figure 1. Various methods of compensation have been recommended. Some advocate the proportioning and mixing of two investments of different expansions; others advocate the use of standard room temperature water for mixing the investment which brings the pattern to a constant starting point for later expansion compensation. It seems to us that the most logical and scientific procedure is to bring the wax pattern back to the temperature at which it was finished—96° to 98° Fahrenheit if direct, room temperature if indirect—and keeping it there until the investment hardens, thereby eliminating the variable instead of compensating for it.

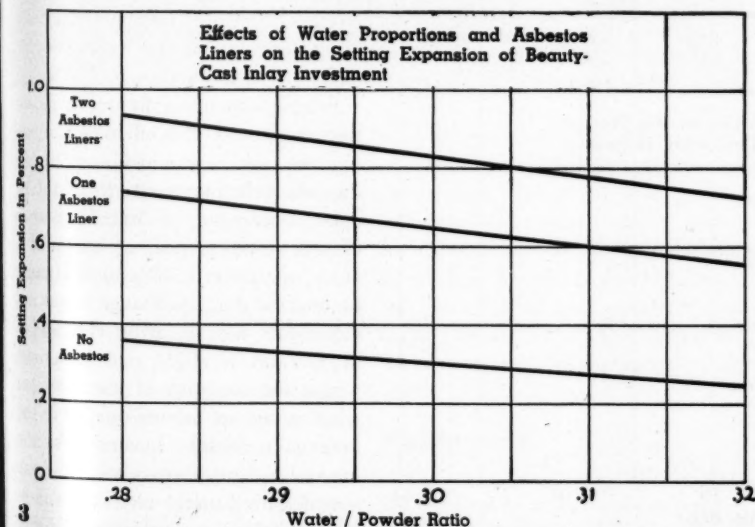
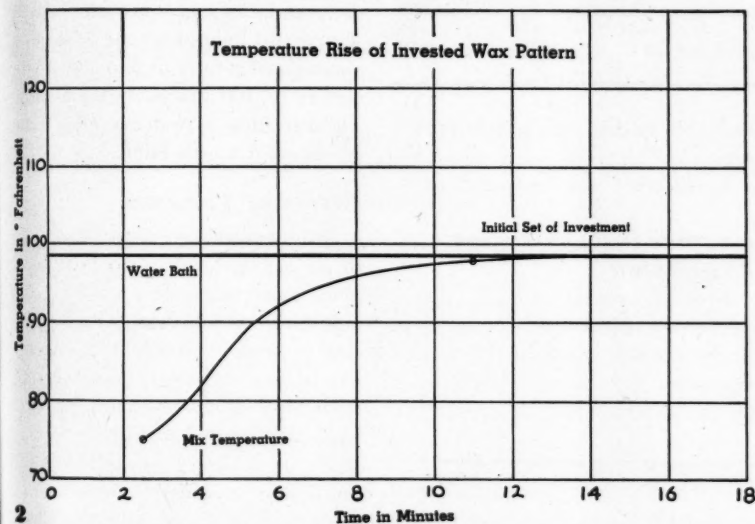
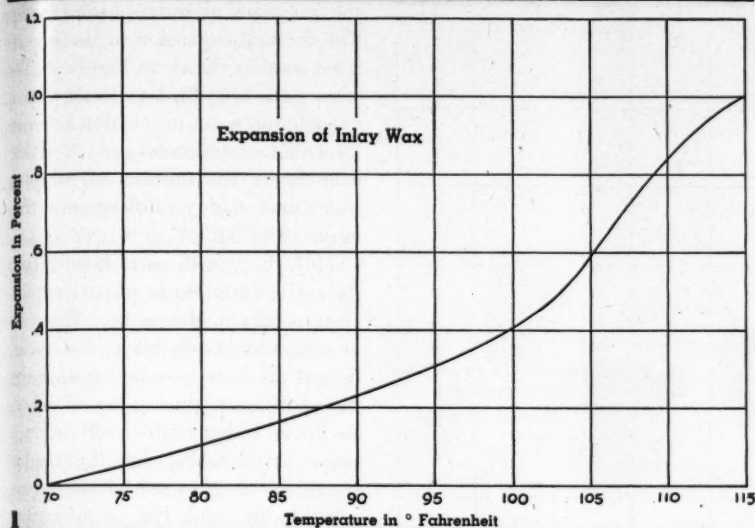
It is believed that the hygroscopic technique described by Doctor

George Hollenback² owes much of its success and accuracy to the use of 98° Fahrenheit water in the water bath. The combination of hygroscopic with thermal expansion is an excellent technique, and we recommend to the reader that he study the aforementioned article by Doctor Hollenback. However, the straight thermal expansion process is the most widely used; therefore, we advocate the following simple method for bringing the wax pattern back to the formation temperature.

Technique—Slip a piece of rubber tubing or hose on the inlay ring, invest the pattern, and place the ring in water of the same temperature at which the pattern was finished. Keep the water level below the top of the rubber sleeve so that no water touches the investment. To prove that the wax pattern reaches and maintains this constant temperature at the time the investment reaches its initial set, we made measurements on an invested M.O.D. (steel die) pattern. A thermocouple was invested in the center of the thickest portion of the wax pattern; the assembly placed in a 98.5° Fahrenheit water bath; and readings covering a period of one hour were made on a potentiometer. The pattern and water bath continued to maintain the same temperature after the eighteen minutes shown in the graph (Fig. 2). The temperature rise of the investment during setting seems to be dissipated, while the investment is maintained in a constant temperature water bath, so that no pronounced inflection of the curve is noted.

¹Mitchel, K. F.: The Use of an Occlusal Matrix in Wax Pattern Fabrication, DENTAL DIGEST 53:432-435 (September) 1947.

²Hollenback, G. M.: Precision Gold Inlays Made by a Simple Technique, J.A.D.A. 30:99-109 (January) 1943.



Gold Shrinkage Factors

The greatest shrinkage factor involved is the casting shrinkage of gold. The classical work at the Bureau of Standards is too well known to need repeating; their determinations placed the value at -1.25 per cent. Of late this figure has been questioned; most workers believe the figure to be higher.

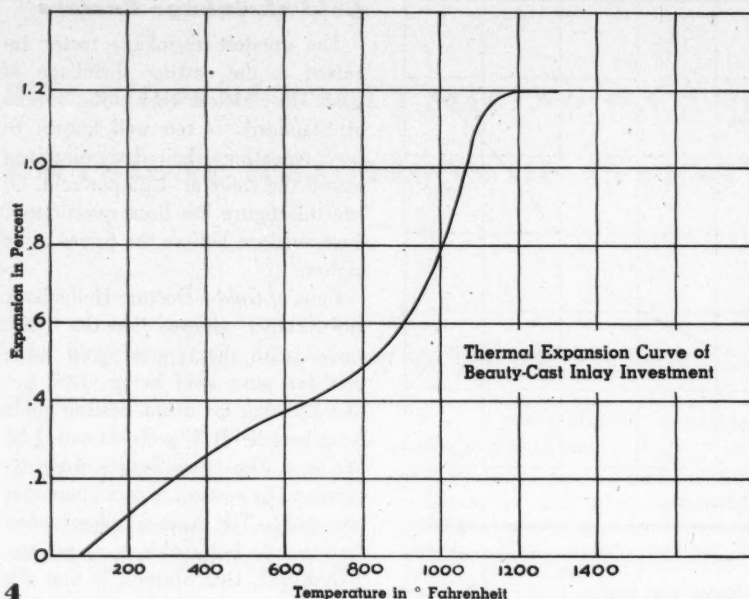
Type of Gold—Doctors Hollenback and Skinner³ showed that the figure varied with the type of gold used, that for pure gold being -1.67 per cent and that for dental casting golds lying between -1.37 per cent and -1.56 per cent. The latter figures were determined by casting in room temperature molds. The exact shrinkage when casting into hot molds is as yet undetermined. Our opinion is that the figures will be a little greater than those given above.

Size and Shape—While the casting shrinkage of gold alloys may be known with a reasonable degree of accuracy, we have found over the years that size and shape of castings affect their fit. Commercial precision casters have found this variation to be true, also. It is due to several causes. A solid piece of metal, such as a solid cylinder or sphere, will have the greatest casting shrinkage because it is not restricted by an investment core; an intricate-shaped piece will have less shrinkage because of the restricting action of the investment core. However, close examination of the intricate-shaped piece will show that the gold has drawn to the heavier portions and has stretched across the isthmuses.

There is another factor to be considered: We know that the investment around a cylinder or sphere is freer to realize its full setting expansion; while in an intricate shape, the wax will greatly restrict the setting expansion of the investment. The computation of compensation figures from laboratory test data on expansion and contraction are therefore only relative.

With these figures in mind, for practical clinical results, inlays may

³Hollenback, G. M. and Skinner, E. W.: Shrinkage During Casting of Gold and Gold Alloys, J.A.D.A. 33:1391-1399 (November) 1946.



4

be divided into three categories. (A greater number of variations is possible but somewhat impractical.)

Types of Inlays—1. Single-surface inlays without much dimensional variation, and of moderate size.

2. Large, single-surface castings; single-surface castings on which one dimension is much greater than the others; castings involving two large volumes connected by a narrow isth-

mus; all moderate two-surface castings.

3. All other classifications.

Factors in Investment Expansion

In our original thought, before conducting the experiments, we were of the opinion that both the setting expansion and thermal expansion of the investment would be affected by

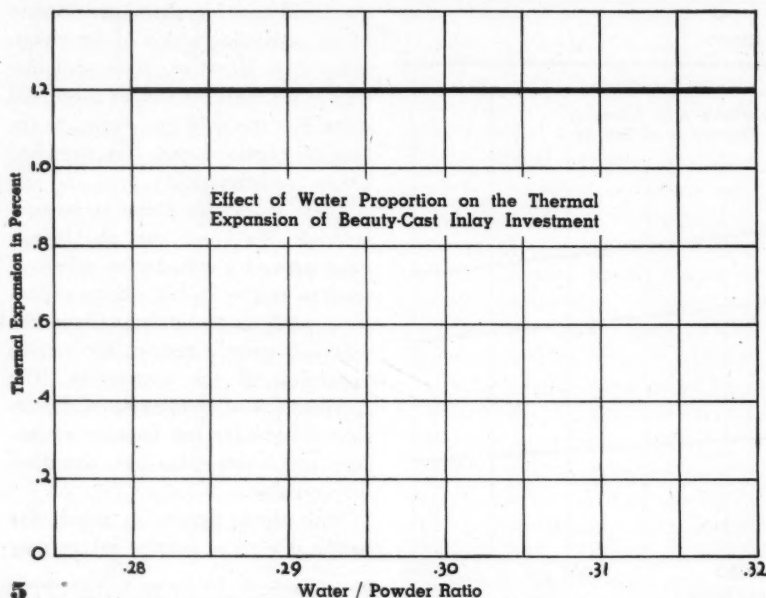
the variation of water-powder ratio. The thermal expansion of the investment used is shown in Figure 4. We were quite surprised to learn that a variation in water proportion between 28 cubic centimeters and 32 cubic centimeters and number of asbestos liners used made no difference in this curve (Fig. 5).

This, then, leads us to believe that the entire variation in relative expansions occurs in the setting. This can be achieved in two ways—by variation of the water-powder ratio or the use of different thicknesses of asbestos liners. Either method will produce satisfactory results, and the reader should try both to see which is best suited to his hand. The manufacturer suggests the use of no asbestos liner for type 1 castings, one liner for type 2, and two liners for type 3, all at a water-powder ratio of 30 cubic centimeters to 100 grams of investment. The variation of water-powder ratio is discussed a little later.

Effect of Vacuum

An important factor is the amount of air incorporated in the mix. Inasmuch as air forms tiny voids, it creates cushions into which the expansion is partly dissipated. This factor has become important since the introduction of the vacuum process. Clinically, we find that where we formerly used 15, 14½, and 14 cubic centimeters of water to 50 grams of investment, we now obtain comparable results with 16, 15½, and 15 cubic centimeters (for types 1, 2, and 3 respectively) by the vacuum process.

Setting expansion figures indicate that vacuum has this effect of increasing the water proportion. Data to date show the increase to be about ½ cubic centimeter of water whereas clinical results require a change of 1 cubic centimeter to 50 grams. It must be realized that the change in setting expansion figures with change of W/P ratio is slight and is almost within the accuracy of measurement when using wet asbestos paper in the measuring trough. Inasmuch as the expansion figures are relative and are not measured under restricted conditions (such as are presented by wax

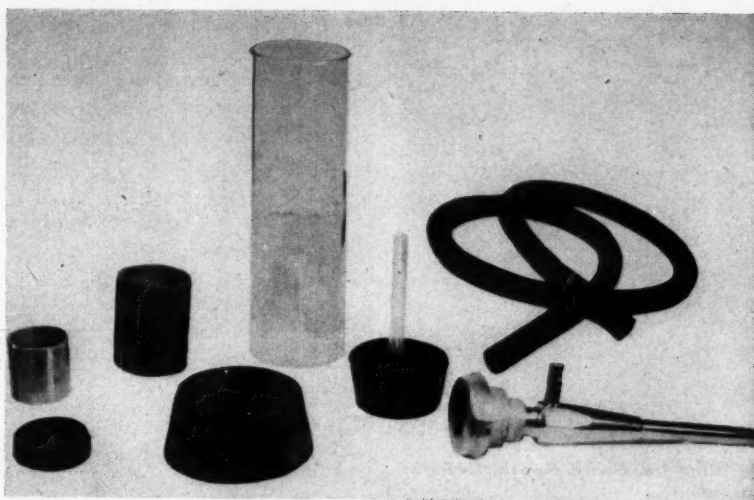


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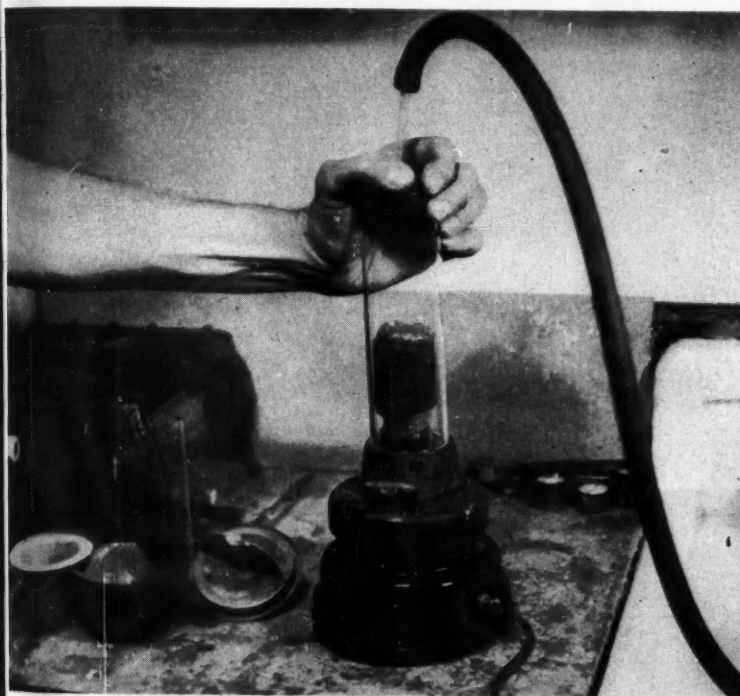
patterns), we can only suggest that vacuum probably has the effect of decreasing the W/P ratio and that the clinical results should guide the operator.

It must be realized that, while the setting expansion curves show relative effects, they cannot be used as absolute values to be added to the thermal expansion figure and the combination balanced against gold shrinkage measurement. It is hoped that a more absolute basis of compensation calculations will soon be available to correlate with clinical findings.

The thermal expansion did not vary, either, with change in W/P or



6A. and 6B. Equipment for vacuum investing need not be elaborate or expensive. B, Unit assembled from parts shown in A.



chased at any dental supply house. We understand that complete, dependable units are now available from dental manufacturers.

Our own equipment consists of the following:

1. A vacuum pump such as that made by Fisher Scientific and capable of producing 29-inch vacuum. This is a water aspirator type (if water pressure is below 45 pounds, a motor-driven, vacuum pump is necessary).
2. Three feet of noncollapsible rubber tubing ($\frac{3}{16}$ inch I.D.).
3. A 5-inch length of 2-inch Pyrex tubing.

in a vacuumed mix. It seems that this investment is highly stabilized in expansion during heating and that variations in expansion are dependent upon varying the factors that control the setting expansion.

It must be pointed out, finally, that the cooling shrinkage of investments is usually much greater than the expansion during heating over the same range. Unless we use special equipment that is too expensive for the average office, there is a drop in temperature from the time the ring is removed from the furnace until the gold

is cast; therefore, it is advisable to preheat the gold so as to minimize the cooling time of the mold before casting. The expansion curve of the investment used is horizontal from approximately 1150 to 1300° Fahrenheit on heating and deviates but slightly on cooling, so that with careful manipulation the shrinkage is negligible (Fig. 4).

Equipment

The equipment for vacuum investing need not be elaborate or expensive (Figs. 6A and 6B). It can be pur-



7. Pattern mounted on sprue base and painted lightly with surface tension-reducing agent.



8. Ring lined with one thickness of wet asbestos.

4. Two rubber stoppers, numbers 11 and 14.

5. An empty carpule or metal tubing of like size.

6. A rubber sprue base that will firmly grip the ring.

7. A 2-inch length of auto radiator hose to fit the ring.

Technique

The technique is quite simple and can be undertaken by the assistant.

1. Mount the pattern on the sprue base and paint lightly with a surface tension-reducing agent such as De-Bubbler or Smoothex (Fig. 7).

2. Line the ring with one thickness of wet asbestos and set in position (Fig. 8).

3. Slip radiator hose onto ring about a half inch. This gives the investment a place into which to boil without loss.

4. Weigh the investment and measure the water.

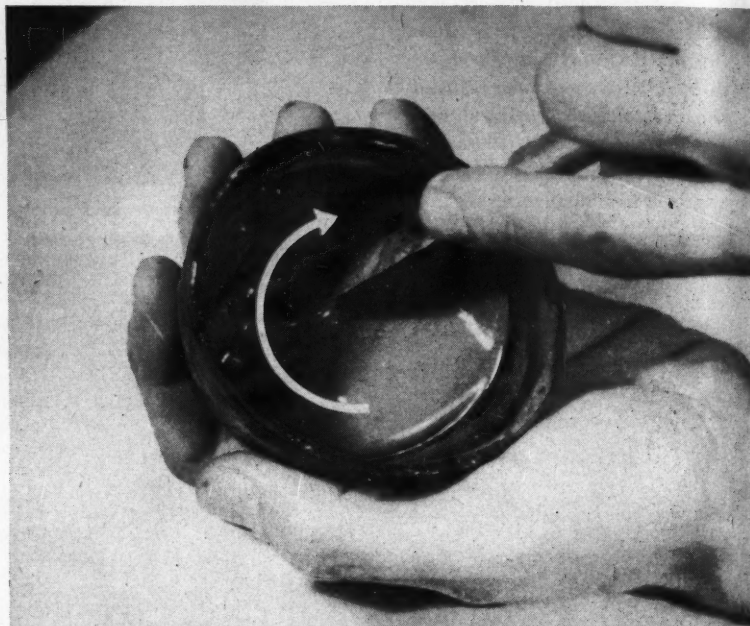
5. Pour water into clean bowl, add investment, and hand spatulate for thirty seconds (Fig. 9A). Mechanically spatulate sixty revolutions in one minute (Fig. 9B). Pour investment into the ring until it is filled slightly over the top of the metal ring (Fig. 10).

6. Set the invested ring on the large base (number 14 rubber stopper), place Pyrex tube (with number 11 stopper into which is placed a piece of metal or glass tubing and connected by a rubber hose to vacuum pump) on large base, and hold down for a

few moments until the air in the mix starts to boil. Maintain in this position until the investment begins to sag. Then place the assembly on the vibrator, or bump it rapidly and lightly on the bench until the investment has leveled out well.

7. Pull hose off the pump to break the vacuum.

8. The radiator hose should be left in place and the ring immersed in water until the initial set is complete. (A thermostatically controlled water bath will make this easy but the same results may be obtained by allowing hot tap water to drip into the pan. A little practice will make this alternative procedure fairly accurate.) If us-



9A. Investment mixture hand spatulated for thirty seconds.



9B. Mechanical spatulation, sixty revolutions in one minute.

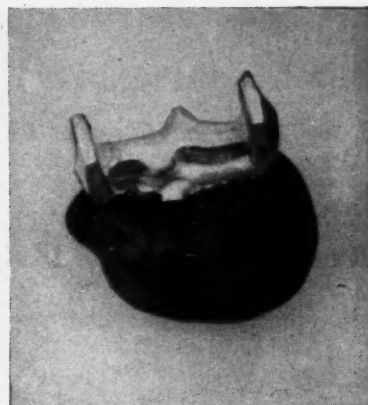


10. Pour investment into ring until it is filled slightly over the top of the metal ring.

ing only thermal expansion, be careful not to allow the water to come in contact with the investment (for in so doing an entirely new factor is

brought into the expansion picture).

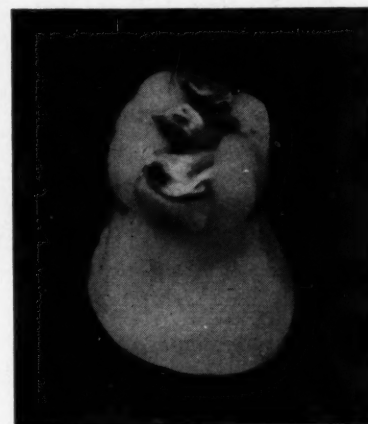
9. After thirty minutes the ring can be placed in the furnace and heated gradually to 1200-1300° Fahrenheit.



11. Casting as recovered from the investment and cleaned with wire brush.

Allow to remain at this temperature for at least thirty minutes but preferably for an hour, at which time it will be ready to cast.

645 Oliver Building.



12. Casting fitted in cavity without touching inside of inlay.

Gastroenterologic Aspects of Psychosomatic Medicine¹

A NORMAL digestive tract cannot have continuous emotional stimuli reach it day after day, week after week, month after month, and even year after year, and still remain normal. A normal digestive tract, working harmoniously with a normal and nonirritating diet, should give no symptoms. Symptoms arise only as the result of inflammatory and infectious diseases, poisons, parasites, neoplastic changes, dietary indiscretions or abnormal nerve impulses.

Any gastroenterologist with a broad clinical experience will honestly admit that the majority of his patients have a symptom complex for which no organic basis can be found.

We have been much too busy in the laboratory developing diagnostic criteria, making test tube diagnoses and using chemotherapy and antibiotic therapy. We have been forgetting that we are treating a patient who is in a troubled world and who is ill because he has an emotionally malad-

justed household. Too often we have failed to recognize the physiologic and structural changes resulting from emotional stimuli. However, deviations from the normal, which must be present if a patient has symptoms, will become apparent with increasing clinical experience and the evidence of laboratory and roentgenologic tests.

From *Journal of the American Medical Association* 134:867 (July 5) 1947.

¹Portis, Sidney A.: *Rev. Gastroenterol.* 14 (June) 1947.

New Aspects of PERIODONTAL RESEARCH*

HAROLD K. BOX, D.D.S., Ph.D., Toronto

DIGEST

The focusing of attention by dentists on visible suppuration in pockets has obscured the basic causes and processes of periodontal disease and led to their neglect. Findings indicate that:

1. Certain fungus-like organisms and associated free bacillary forms are direct causes of at least one form of periodontal disease—necrotic periodontitis.

2. Filterable necrotizing enzymes produced in the pocket are primary etiologic factors in certain fundamental periodontal lesions.

THE GREAT pathologist Adami placed the causative agents of disease in two categories; namely, direct and predisposing; and, according to him, predispositions are "the result of the presence of assisting causes or of the absence of preventing properties."

Years ago in medicine, when few direct causes of disease were known, many predisposing causes were recognized. With the advent of bacteriologic research, many direct causes were discovered, as evidenced by the number of specific microorganisms brought to light. Today, concerning

the etiology of periodontal disease, predisposing causes, both general and local, have received the main attention. It must be admitted that the various attempts to show that some specific organism could be classed as a direct causative agent have not fared very well.

Among the general metabolic conditions cited in the literature are various endocrine disturbances, vitamin deficiencies, and autointoxication. Among the local predisposing factors, traumatogenic occlusion has been given a prominent place. Its localizing capacity in gingival and periodontal disease is more or less generally recognized today.

The precise relationship of general and local metabolic states to the establishment of infection is not thoroughly understood, and in our want of knowledge we take shelter behind the well-known terms "lowered resistance" and "lowered vitality" of the tissues.

The importance of another local factor, namely, the presence of "incubation zones," should be stressed at this time. In these regions, ideal conditions, from a cultural standpoint, are provided for the development and increase in virulence and anaerobes.¹ Protection against rough usage is also furnished, which is especially needed for certain organisms to be mentioned later. In passing, the relation of the eruption of teeth should be emphasized, especially difficult eruption in the mouths of chil-

dren where the gingival tissues are swollen with the establishment of "incubation zones." Inflammation of the gingival tissues of children, associated with erupting teeth, should be eliminated without delay as a preventive measure against adult periodontal disease. This conception was advanced by Becks.²

The Problem of Specific Infection

The prevailing teaching today is that "pyorrhea" is not a specific infection. Here the term is used to denote pus-flow from the pocket, and the condition is regarded as dependent entirely upon the existence of the pocket. This circumscribed viewpoint is probably correct and serves to show how much importance has been attributed to the presence of visible suppuration. For many years, this has tended to dominate the nomenclature, the conception of the basic nature of the infectious processes concerned, and the therapy.

It must be pointed out, however, that this "pyorrhea" point of view is not adequate to explain the fundamental nature of the processes concerned in relation to certain gingival and periodontal pockets. Clinical evidence plainly teaches that many pockets of considerable depth are free from visible suppuration. This is the "dry pyorrhea" of the older practitioners, and to speak of it as "apurulent pyorrhea" obviously does not clarify matters. Both of these terms involve a contradiction. We are in agreement with Bunting and Hill³

*Presented at the National Convention of Canadian Dentists, Toronto, May 29, 1946 and reprinted from *The Journal of the Canadian Dental Association* 13:3-10 (January) 1947.

¹Box, H. K.: Necrotic Gingivitis, *Can. D. Research Found., Bull. No. 14*, 1930.

²Becks, Hermann: Normal and Pathologic Pocket Formation, *J.A.D.A.* 16:2167-2188 (December) 1925.
³Bunting, R. W., and Hill, T. J.: *A Text-Book of Oral Pathology*, Second Edition, Philadelphia, Lea & Febiger, 1940.

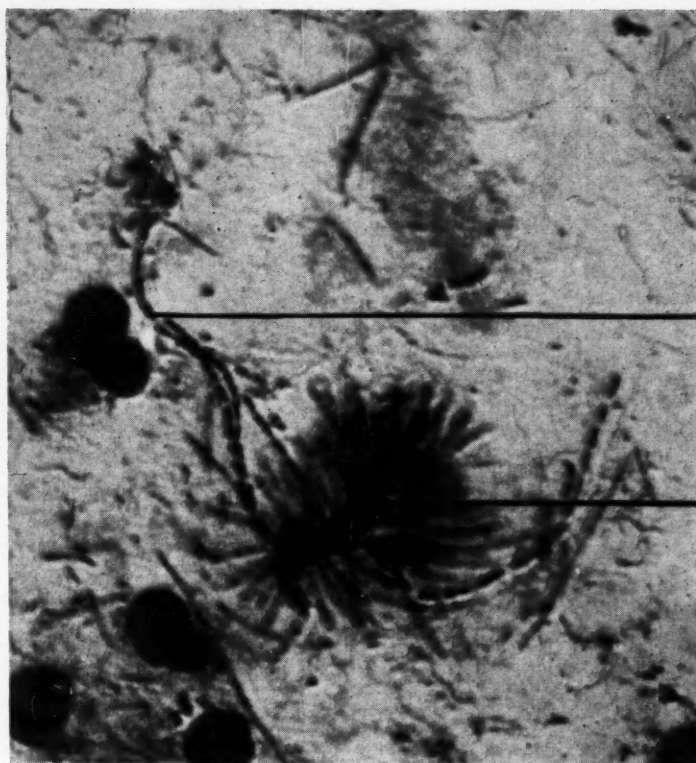
1. *Leptothrix falciformis* organism in smear from deep periodontal pocket. (a) Filament; (b) head. (Note the long segmented filament and fructifying head with radiating falcate spore bodies [Aisenberg], or bacillary forms.)

that in the great majority of cases the type of infection is apurulent. It should be pointed out, in this relation, that such purulent pockets are commonly found on the enamel surface of erupting teeth of children. When suppuration does occur in this type of pocket, wherever found, we as a rule regard this event as a secondary phase of a condition that had its beginning in a primary necrotic process.

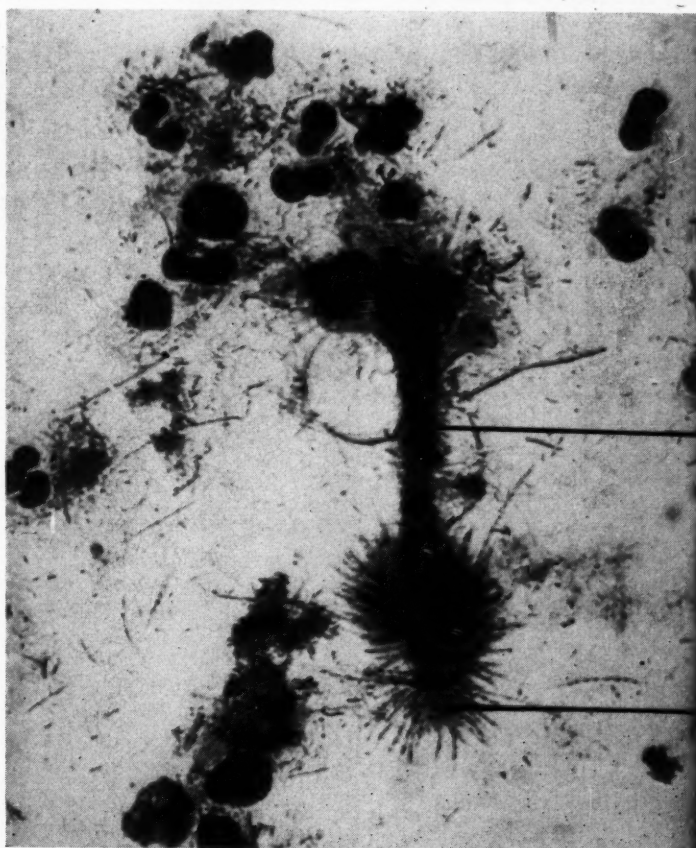
Over the years, various organisms have been imputed as direct causative agents, or playing the main role, in the production of periodontal disease. Sixty-five years ago, Arkovy⁴ mentioned a "certain fungoid formation" which he found constantly occurring in close relation to "wasting of the alveoli and the gingival margin as well as the subsequent loosening of the teeth." Black⁵ regarded his "phagedenic pericementitis" as caused by a specific form of microorganism and suggested the probability of a fungus causing and maintaining this condition. Later, certain spirochetes with the fusiform bacillus were thought responsible;⁶ then *Entamoeba buccalis*;^{7,8} and *Streptococci*.⁹ Smith¹⁰ regarded "pyorrhea," using the common term, as a specific infec-

⁴Arkovy, Joseph: A Discussion "On the Premature Loss of Teeth by Destruction of Their Alveoli," Tr. Internat. M. Congress, London, 3:575, 1881.
⁵Black, G. V.: Diseases of the Peridental Membrane, Am. Syst. of Dent. Vol. I., 1886.
⁶Waguchi, Hideyo: *Treponema Mucosum*, J. Exper. Med. 16:194 (July) 1912.
⁷Barrett, M. T.: The Protozoa of the Mouth in Relation to Pyorrhea Alveolaris, D. Cosmos 56:948-953 (August) 1914.
⁸Bass, C. C., and Johns, F. M.: The Specific Cause and the Prompt Specific Cure of Pyorrhea Alveolaris or Riggs' Disease, D. Summary 34:994-997 (December) 1914.
⁹Hartzell, T. B.: A Discussion of the Essential Factors in the Treatment of Pyorrhea, D. Items of Interest 41:45-50 (January) 1919.
¹⁰Smith, D. T.: Oral Spirochetes and Related Organisms in Fusio-Spirochetal Disease, Baltimore, The Williams & Wilkins Company, 1932.

2. Large organism, with thick stalk and radiating bacillary forms, found in smear from a deep periodontal pocket. (a) Stalk; (b) radiating bacillary forms. (Note similarity of this organism to the one near the base of the pocket shown in histologic section, Figure 4).



a



a

b

3. Large branching organism with numerous radiating bacillary forms, found in smear from a deep periodontal pocket. (a) Stalk; (b) bacillary forms; (c) filament.

tion with a symbiotic group of anaerobic organisms common to necrotic gingivitis, viz., spirochetes, fusiform bacilli, vibrios and cocci. According to this investigator, "pyorrhea" develops on a background of general and local disturbances and frequently both predisposing factors are present.

Fungus-like Organisms

In 1944 and again in 1945, we reported the finding, in human sections, of complex forms of organisms in the cellular debris at the base and along the wall of the pocket, resembling organisms described by Beust, the Deans, and other investigators.

1. Leptothrix falciformis

Beust¹¹ first described certain mouth organisms to which he gave the name *Leptothrix falciformis*. They appear to comprise a stem or stalk from which radiate many falcate or scythe-shaped spore bodies or conidia. According to Beust¹² these conidia or asexual spores are provided with peritrichate flagella, that is to say, long, delicate filaments surround the entire organism.** He regarded these falciform spore bodies as identical with fusiform bacilli found in smears of "materia alba." He classified the *Leptothrix falciformis* with the algae-like fungi and regarded it as pathogenic.

¹¹Beust, T. B.: A Contribution to the Morphology of the Microorganisms of the Mouth, D. Cosmos 50:594-595 (June) 1908.

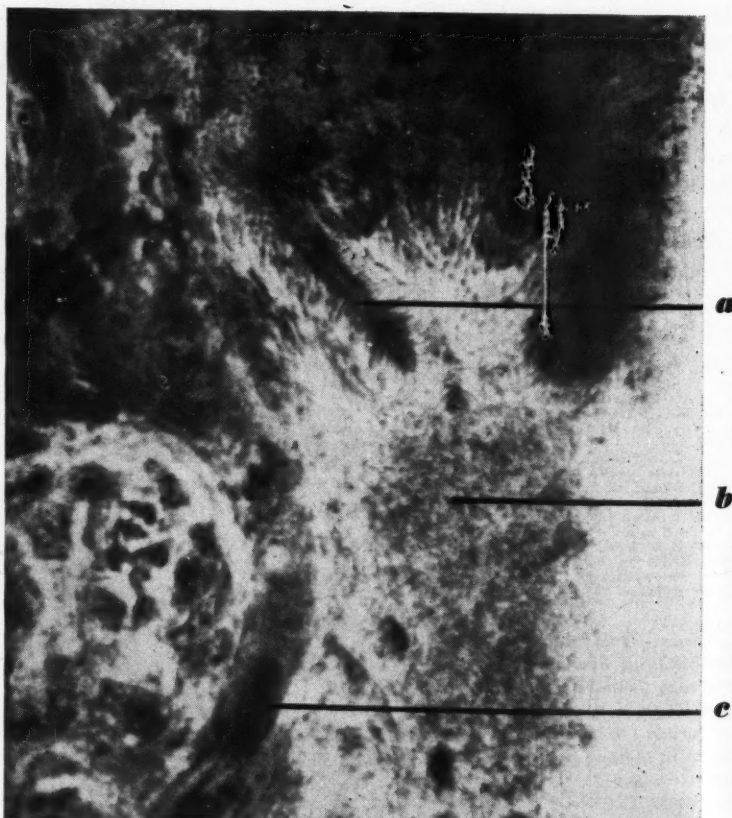
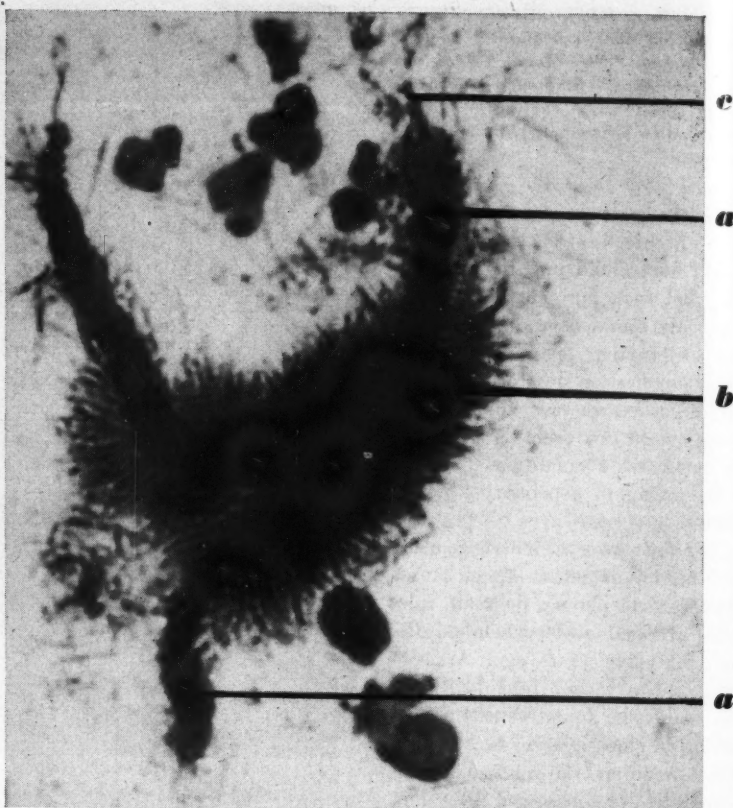
¹²Beust, T. B.: Morphology of the Fusiform Bacillus, J. D. Research 16:379-385 (October) 1937.

**, . . The studies of Smith¹⁰ and Hine¹³ failed to demonstrate the presence of flagella on fusiform bacilli. Boe¹⁴ apparently was able to show that flagella are present. Recently, with the electron microscope, the writer has shown long flagella-like filaments which seem to arise from fusiform organisms obtained from periodontal pockets.

¹³Hine, M. K.: Motility of Fusiform Bacteria, J. D. Research 15:168 (June-August) 1935.

¹⁴Boe, John: On the Motility of Fusobacterium, Acta path. et microbiol. Scandinav. 20:573, 1943. (Current Literature Abstract, J.A.D.A. 33:655 [May 1] 1946.)

4. Large fungus-like organism near the base of a pocket in histologic section. (a) Fungus-like organism; (b) homogeneous material at base of pocket; (c) epithelial cell. (Note the stalk and radiating bacillary forms. The underlying homogeneous material teems with free bacillary forms.)



5. Cementum cuticle close to the base of pocket shown in Figure 4, undergoing apparent disorganization. (a) Disorganized cuticle; (b) epithelium; (c) cementum; (d) shrinkage space.

Aisenberg¹⁵ described the stem of this organism as segmented, solid, and unbranched. He concluded that the falcate spores are not attached to this stem, but arise in a jelly-like matrix which forms a sheath around it. This matrix appears to be created by certain spherical bodies which appear early on the stem. Aisenberg's findings were made from smears taken from necrotic gingivitis (Fig. 1).

2. Branching Plant-like Organisms

Dean and Dean¹⁶ observed in smears from necrotic gingivitis a "dichotomous branching type of growth." Each branch comprises a central shaft made up of mycelial filaments containing granules. From this shaft, bacillary forms, including fusiforms, radiate. Cocklebur formations containing bacillary forms are invariably found near the central shaft and, at times, at the end of it. From their observations, including cultural studies, these investigators concluded that the fuso-spirochetal organisms found in the lesions of necrotic gingivitis "represent phases in the life-cycle of a higher bacterium or microscopic plant." Dean and Dean suggested that more than one genus might be involved (Figs. 2 and 3).

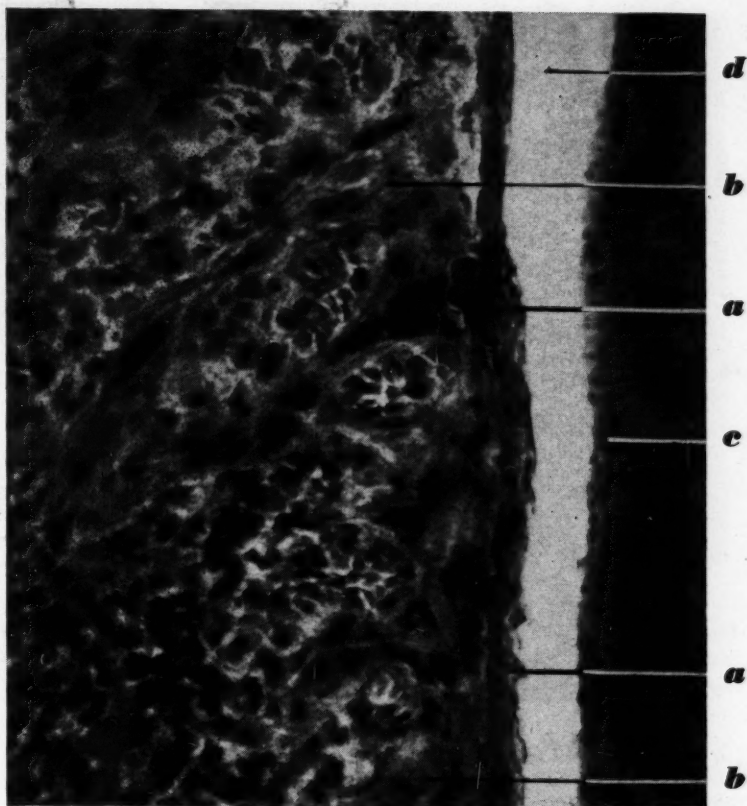
Recent Microscopic Observations

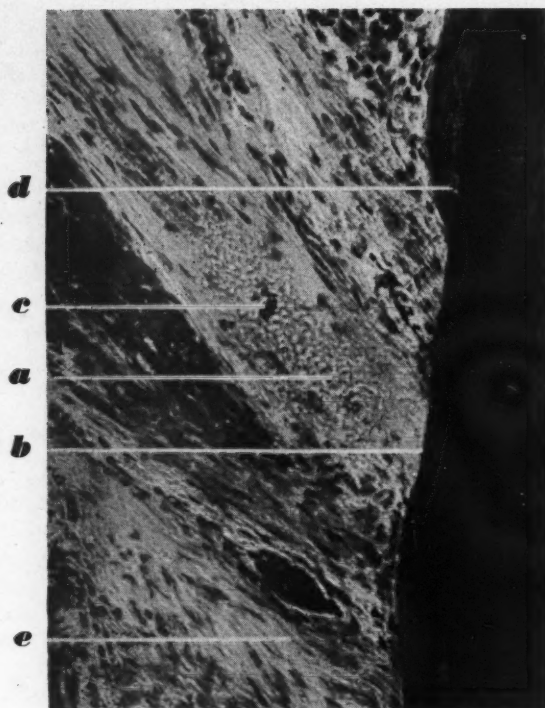
From the available evidence from various sources, we have come to regard these fungus-like formations and associated free organisms, as a direct causative factor in a form of

¹⁵Aisenberg, M. S.: Morphologic Studies of Microorganisms of Fusiform Type, D. Cosmos 75:546-550 (June) 1933.

¹⁶Dean, R. D., and Dean, M. T.: Cultural Observations on Fuso-spirochetal Infections, J. D. Research 11:759-770 (October) 1931.

6. Apparent transformation of connective tissue fibers near base of epithelial attachment into a vacuolated hyaline material. (a) Vacuolated material; (b) connective tissue fibers; (c) base of epithelial attachment; (d) cementum surface devoid of cementoblasts. (Note absence of cementoblasts on tooth surface in this region.)





7. Disorganization of large fiber bundle near base of epithelial attachment. (Note fairly large region involved and the mild vacuolation. Here fibroblasts are few, and area of attachment on cementum shows no cementoblasts. Note also the small vessel minus endothelium lying in the disorganized fibers.)

(a) Region of hyaline-like change and vacuolation.

(b) Cementum surface devoid of cementoblasts.

(c) Capillary lying in disintegrated fibers.

(d) Base of epithelial attachment.

(e) Normal fiber bundle.

periodontal disease we have termed necrotic periodontitis.¹⁷

The following observations concerning the pocket, the epithelial attachment, and the connective tissue attachment seem significant:

1. The close proximity of the parent organism to:

a) Regions of necrosis in pocket epithelium.¹⁸

b) Breaks in the epithelial continuity of the pocket lining.¹⁸ Their presence was reported by the writer

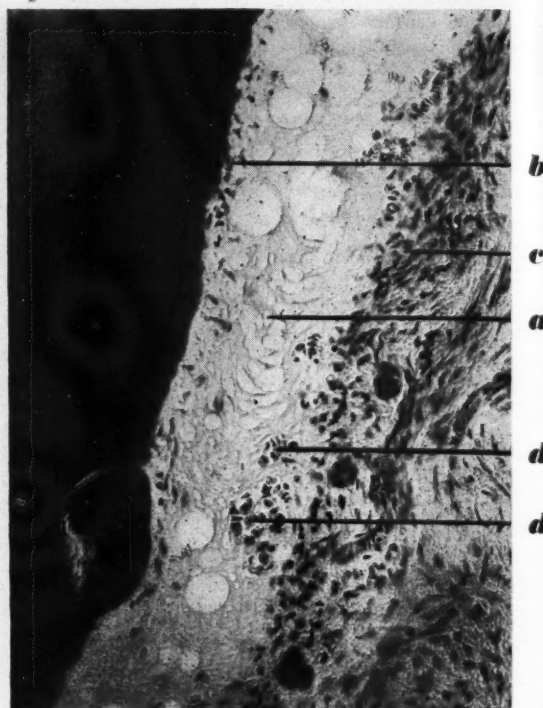
as early as 1921 and again in 1928.

c) Disorganized cementum cuticle in the pocket. The cuticle is a keratinous layer and is resistant to the action of acids and alkalis. The cuticle destruction in the pocket suggests the action of keratin-hydrolysing enzymes present in this region. It may be of interest to point out that nails and horn, when added to media, are utilized by certain fungi.¹⁹

2. These organisms have been observed at the base of the pocket adjacent to necrotic epithelial attachment, and also deep in the necrotic epithelial attachment itself. Through this loss of attachment, the pocket is deepened. The deepening of the pocket proper is a phase which belongs to the epithelial attachment.

These organisms have also been noted near the pocket base where the cementum cuticle under the epithelial attachment shows marked disorganization for quite a distance apically (Figs. 4 and 5).

3. Certain changes have been noted under and near the base of the epithelial attachment beneath a deep



8. Extensive changes in periodontal membrane adjacent to cementum surface. (Note the vacuolated coagulum lying between attached layer of fibrous tissue on the tooth and the periodontal tissues. Note also the blood vessels devoid of endothelium, with the red cells intact.)

(a) Vacuolated coagulum.

(b) Fibrous tissue remnants on cementum surface.

(c) Fibrous tissue of periodontal membrane.

(d) Lumen of blood vessel almost filled with red blood cells.

pocket where the attachment is necrotic and where these complex parent organisms are present deep down in the necrotic material. For some distance crownwards from its present base, the epithelial attachment lies outwards from the tooth, forming a wedge-shaped space. This space, which may extend a considerable distance crownwards, is filled with a hyaline-like material showing marked vacuolation.

In some sections, the adjacent connective-tissue fibers and cementoblasts have disappeared, with apparent transformation of the tissue into a vacuolated hyaline material. This change can be followed apically and

¹⁷Box, H. K.: Necrotic Periodontitis, *Oral Health* 35:321-329 (May) 1945.

¹⁸Box, H. K.: Can Specific Infective Factors Operate to Deepen a Pocket? *J. Canad. D. A.* 10:427-435 (October) 1944.

¹⁹Belding, D. L., and Marston, A. T.: *A Textbook of Medical Bacteriology*, New York, D. Appleton-Century Company, 1938.

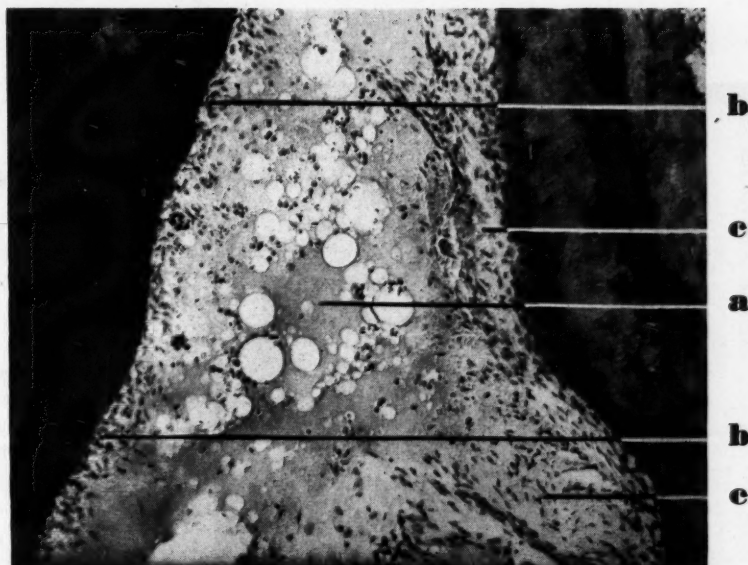
away from the tooth to an intact fiber bundle (Fig. 6).

A good example of this hyaline-like change in a fiber bundle close to the base of the epithelial attachment is shown in the next illustration. Through swelling, the fibrils have become homogeneous. This has been followed by mild vacuolation. It will be noted that where the fiber bundle has been involved, few fibroblasts are present, and the area of attachment to the cementum is devoid of cementoblasts. The disorganization of the fibers seems to stand in close association with a small capillary, lacking its endothelial cells and lying in the disintegrated fibers (Fig. 7). In some instances, these changes are to be observed in nearby fiber bundles and affecting them in regions considerably distant from the cementum surface to which they are attached.

Important changes are to be observed in the deeper soft tissues, involving the periodontal membrane for some distance apically. These changes are characterized by loss of endothelium of certain blood vessels; hemorrhage and edema; and the presence of a coagulum of unknown nature. The red blood cells are mainly intact and the absence of infiltration of leucocytes is a striking feature (Figs. 8 and 9).

Our interpretation of the microscopic evidence is that the agent or agents responsible for the changes appear to originate in the pocket, passing through the intercellular spaces of that part of the epithelial attachment lying close to the tooth. The findings suggest that extra-cellular, proteolytic enzymes are involved.*** The cuticle is attacked, and, with penetration to the collagen fibers at the base of the epithelial attachment, these fibers are disorganized.

It seems plain that the destructive changes, localized and widespread, observed in the deeper fiber bundles, and the extensive lesions in the periodontal membrane are due to the ac-



9. Great alteration of periodontal membrane in which a widespread, homogeneous, vacuolated coagulum fuses with the fibrous tissue on the tooth and bone.

(a) Homogeneous coagulum.

(b) Fibrous tissue remnants on cementum surface.

(c) Fibrous tissue attached to bone.

tion of a fairly powerful necrotizing agent. According to our viewpoint it is probable that this agent is carried by the lymphatic vessels leading from the base of the pocket and liberated into the tissues.

Jennison²¹ showed that some species of bacteria are able to attack gelatin but are unable to digest collagen. His experiments showed that extracellular, collagen-splitting enzymes are produced by a number of bacteria. It is also known that active, proteolytic filtrates are produced by soil fungi.²² Henrici²³ has mentioned that some fungi produce an enzyme like trypsin. In their investigations of acute hemorrhagic pancreatitis, Rich and Duff²⁴ carried out certain experiments on dogs where subcutaneous injections of trypsin were made. They showed that trypsin has

a powerful necrotizing action on the walls of blood vessels. It is interesting, in the light of our findings, to note that red blood cells are resistant to trypsin.²⁵ According to Smith,¹⁰ powerful necrotizing enzymes are produced by the fuso-spirochetal group of organisms. These enzymes are able to destroy the elastic tissue and the muscle layer of the bronchi.

Conclusions

1. Too much emphasis has been given to the presence of visible supuration in the pocket. This has tended to dominate our mode of thinking in periodontology, and more basic causes and processes have thus been obscured and neglected.

2. The findings seem to warrant the tentative assumption that certain fungus-like organisms, and associated free bacillary forms, have a direct causative relationship with at least one form of periodontal disease.

3. Filterable necrotizing enzymes produced in the pocket appear to play a dominant role in the etiology of certain fundamental periodontal lesions.

With investigations now under way in the Banting and Best Department of Medical Research, it is hoped that obscure phases of the problem will be clarified.

Faculty of Dentistry, University of Toronto.

²¹Jennison, M. W.: Bacterial Collagenase, J. Bact. 50:369 (September) 1945.

²²Wakeman, S. A.: Studies on the Proteolytic Enzymes of Soil Fungi and Actinomycetes, J. Bact. 3:509 (November) 1918.

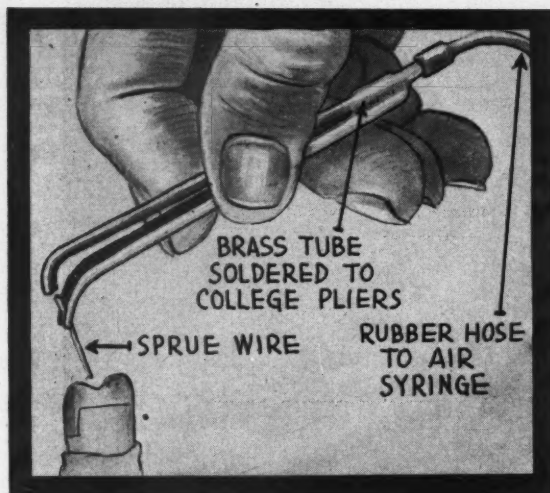
²³Henrici, A. T.: Moulds, Yeasts and Actinomycetes, New York, John Wiley & Sons, Inc., 1930.

²⁴Rich, A. R., and Duff, G. L.: Experimental and Pathological Studies on the Pathogenesis of Acute Haemorrhagic Pancreatitis, Bull. Johns Hopkins Hosp. 58:212-259 (March) 1936.

²⁵Wells, H. C.: Chemical Pathology, Philadelphia, W. B. Saunders Company, 1920.

***... It has been shown by Burge and Burge²⁶ that nascent oxygen destroys enzymes. From a periodontal standpoint, it is of interest to note that nascent or atomic oxygen therapy has been widely recommended, e.g. the superoxol treatment of Orban.
²⁶Burge, W. D., and Burge, E. L.: The Role of Nascent Oxygen in Regulating the Activities of Enzymes in Animals and Plants, Am. J. Physiol. 34:140 (May) 1914.

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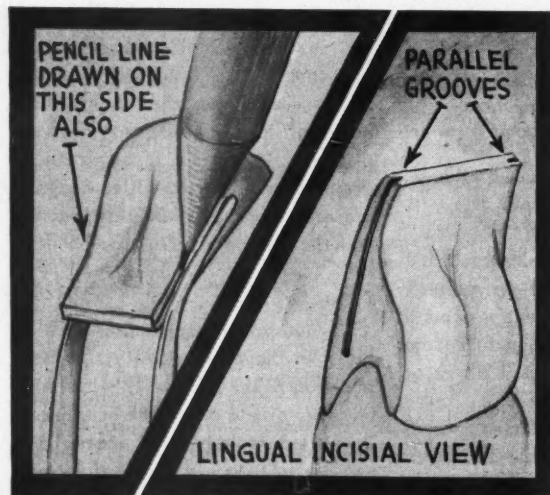


Rapid Sprue-cooling for Direct Inlays

S. G. Pensak, D.D.S., New York City

1. A thin piece of brass tubing is soldered over the top of a pair of cotton pliers. A piece of rubber tubing, which leads to a chip blower or an air syringe, is attached to the metal tubing. The sprue wire is grasped in the beaks of the pliers, heated, and inserted into the wax. Immediately upon insertion, the assistant or the patient is asked to squeeze the bulb of the chip blower or to press upon the control of the air syringe to direct a stream of air through the tube onto the wax pattern.

2



Ensuring Parallel Retention Grooves in Abutment Preparation

Lieutenant (jg) H. W. Jacobs, Jr. (DC) USNR, Munich, Germany

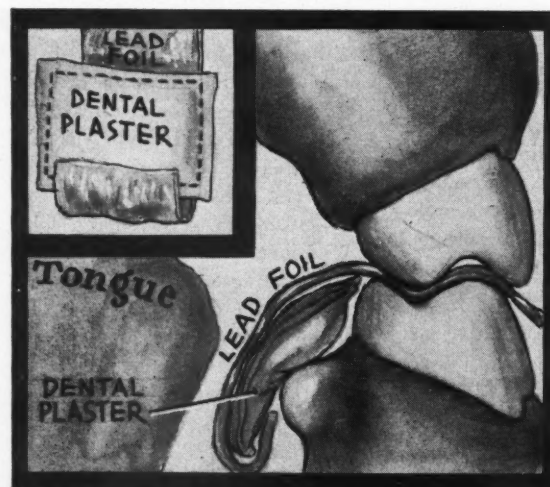
2. An aid to making the retention grooves in bridge abutments or three-quarter crown preparations is to place the beaks of a pair of cotton pliers on the mesial and distal slices of the prepared teeth. The beaks are held firmly in position and a sharp, pointed pencil is then employed to draw two lines, the upper edges of the cotton pliers being used as straight edge rules. The parallel lines thus formed are followed in cutting the grooves.

A Retention Device for a Dental Poultrice

H. Rodnick, D.D.S., New York City

3. When it is considered advisable to apply a dental poultice to an inflamed lingual area, the plaster may be held in position with a piece of lead foil from an x-ray film. The foil at the same time protects the tongue. The lead foil is bent to retain the poultice and is carried over the occlusal surfaces to be held in position when the teeth are closed.

3



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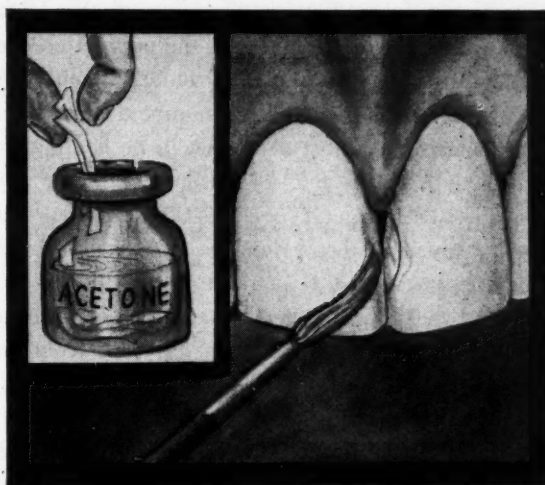
You do not have to write an article. Furnish us with rough drawings or sketches, from which we will make

or **SUGGESTIONS . . .**

A Method of Protecting Silicate Cement

P. A. Ortiz, C.D., Pergamino, Argentina

4. Dissolve strips of celluloid in a flask containing 15 cubic centimeters of acetone. When the silicate has been dissolved, the protective may be applied to the silicate restoration with a small brush or an instrument.

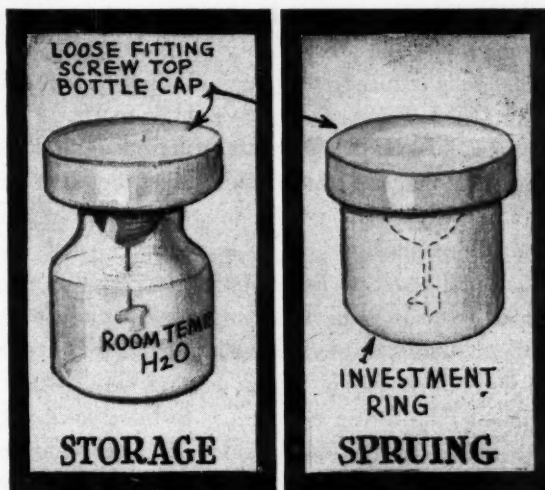


4

A Method of Storing and Spruing Wax Patterns

Samuel Pruzansky, D.D.S., Boston

5. Select a small, wide-mouth medicine bottle with a screw top large enough to fit over an inlay investment ring. Inside the bottle cover wax up a form modelled after a conventional sprue former. After attaching a wax pattern to the pin, insert in the bottle in room temperature water. When ready to invest, remove the cover from the bottle and use it as a base with an investment ring.

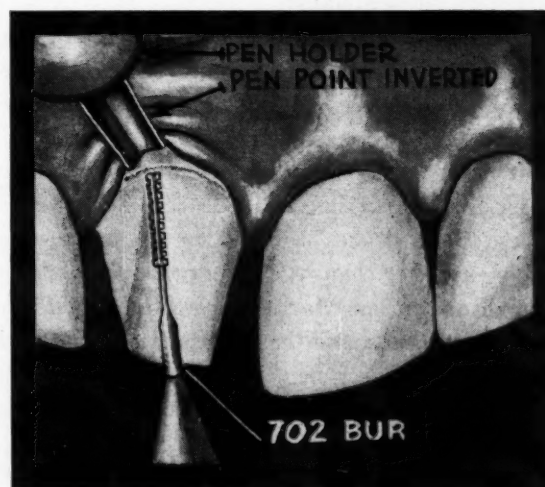


5

A Gingival Retractor for Use in Jacket Crown Preparation

Daniel Galle, Jr., D.D.S., Long Island City, New York

6. A pen point is inverted and placed in an ordinary pen holder. The inverted point is placed under the gingival margin and is used to retract the gingival tissue in making the shoulder for a jacket preparation. This retraction of the soft tissue will permit a shoulder to be made well under the free gingival margin without lacerating the tissue. A number 702 bur is the one of choice.



6

suitable illustrations; write a brief description of the technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time.

Turn to page 507 for a convenient form to use.

Send your ideas to: Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

The EDITOR'S Page

GERIODONTOLOGY is the name given to the dental problems of elderly people. As the population continues to have more and more elderly people, we may expect to see increasing numbers of them in the dental office. Most of them will be coming for prosthetic services but a significant number will require oral surgery, periodontal attention, and the treatment of the carious lesions that are often found in senescence.

From the point of view of anatomy and physiology, the senescent patient is different from the younger patient: Tissues have begun to lose their vigor, the degenerative changes have begun to exact their toll. In early and middle life, tissues have a tonicity and a tolerance that are lost as one grows older. What services we perform for older people are given against a background of diminishing vigor and adaptability of tissues. Tissue resistance is reduced; resiliency is being lost; repair is retarded. These are the physiologic facets.

Senescence also presents different emotional problems that must be considered by the clinician. Neither in geriatrics nor in geriodontology has enough emphasis been given to the mental and emotional characteristics of the elderly. The emotional hazards to dental treatment are often more difficult than the physical. Fitting the personality of the elderly patient to the denture may be more difficult than fitting the denture to the tissues. Old age brings mental quirks and character deficiencies that present real problems in patient management. Many of these character changes are explainable on a physical basis.

Alvarez¹ of the Mayo Clinic has been stressing the usually unrecognized cerebrovascular changes in older people as an explanation for character regressions. Alvarez speaks of the "little strokes" that often come in the night and are frequently masked as gastrointestinal or cardiac episodes. These "little strokes" are sudden and produce notable character changes: "the nervous breakdown, the change in behavior, the increased irritability, the forgetfulness, and the tendency to weeping and depression." Every dentist has at some time observed these phenomena among relatives, friends,

and patients. Few of us have been discerning or understanding enough to realize that in these cases we have been looking at the end point of organic diseases—cerebral arteriosclerosis.

Quite apart from the behavior problems associated with cerebrovascular changes are the emotional problems that are so intimately a part of the aging process. Growing old is an affair of tissues and of the emotions. Gitelson² has recently stated that "emotional problems of elderly people are problems of adaptation . . . Disturbing to the older person is the even slight failure of memory which may be the first herald of decline. The dulling of recent memory and the sharpening of the remembrance of things past are psychologically an actual turning away from the painfulness of the present. The present is lacking in both the dependent security of childhood and the independent powers for maintaining security of the mature years. The past carries forever the record of life lived successfully. This occurs even in the case of those persons who may not have much to look back upon according to external standards.

"The tendency to become more domineering is a compensatory reaction against the feelings of inferiority and inadequacy. Mild depressiveness is a common characteristic of elderly persons engendered by the feeling of being left behind by life, of being deserted."

Before a dentist undertakes extensive treatment for an elderly person, he will protect himself if he makes a personality inventory of the patient in advance of treatment. The senescent patient with loss of muscle power, with hyperirritability of tissues, with the signs of rapid degenerative changes, is not a good risk for extensive treatment. If, added to these physical hazards, we find an old person who lacks the will to cooperate and the zest for living, we are confronted with a near-hopeless combination.

We are going to hear more about geriodontology. We should begin our studies of the subject by attempting to understand the world and its people as seen through the failing vision of the senescent.

¹Alvarez, Walter C.: What Is the Matter with the Person Who Is Always Tired?, Northwest Med. 46:437-443 (June) 1947; abstracted, J.A.M.A. 134:1013 (July 19) 1947.

²Gitelson, Maxwell: Emotional Problems of Elderly People, Proc. Inst. Med. Chicago 16:416-417 (June 15) 1947.



MEDICINE

and the Biologic Sciences

Most hospitals maintain their own rules and regulations for rendering services. But in general the rules conform to a more or less standard procedure.

Except in emergency no patient is admitted to the hospital until after a provisional diagnosis has been written on the admission sheet. In case of emergency the provisional diagnosis is entered on the admission sheet as soon after admission as possible.

The attending physician or dentist is held responsible for giving such information as may be necessary to assure the protection necessary from those who are a source of danger from any cause whatsoever.

All orders for treatment should be in writing. Verbal orders are not accepted or carried out. An order is considered to be in writing if dictated to a senior nurse or other authorized person and signed by the attending doctor. Orders dictated over the telephone should be signed by the person to whom dictated with the name of the doctor per his or her own name. The hour at which the order is given should be stated. At his next visit the doctor should sign such orders.

The attending doctor is held responsible for preparation of a complete medical record for the hospital files. This record should include: identification data, physical examination, special reports such as consultations and clinical laboratory, other provisional diagnosis, medical and surgical treatment, pathologic findings or progress notes, final diagnosis, condition on discharge, follow-up and autopsy report when available. No medical record is filed until it is complete.

All records are the property of the hospital and should not be taken away without permission of the attending doctor and administrator. In case of readmission of a patient, all previous records are available for the use of the attending doctor. This applies whether the patient is attended by the same doctor or by another.



A complete history and physical examination should be written in all cases within twenty-four hours after admission. And usually, except in case of emergency, it is recommended that patients for major operations should be admitted not later than 4 p.m. the day previous to the operation.

By-Laws of the Staff, W. A. Foote Memorial Hospital, Jackson, Michigan, Adopted June 11, 1945.



Factors Influencing Arterial Blood Pressure

In normal people the level of arterial blood pressure is maintained at a relatively constant height. The range of variation in pressure is wide and is noticeably influenced by both internal and external environmental factors.

Some clinicians set the range in normal men and women at 90 to 120 millimeters of mercury systolic and 60 to 80, diastolic. Others believe that 110 to 140 systolic and 70 to 90 diastolic are closer to normal.

The majority of observers find that the systolic, mean, and pulse pressure rise gradually from 40 to 62 years, then rapidly from 62 to 85 years. There seems to be little correlation of the diastolic pressure with age.

Usually sleep causes a fall in pressure; however, bad dreams and restless sleep may actually cause a rise. Systolic pressure is minimal during the fourth hour of sleep. During the day the pressure rises gradually, being highest about 6:00 or 7:00 p.m. It often rises as much as 15 to 20 millimeters of mercury.

All observers state that expressed or repressed emotions may cause large rises in pressure. Likewise, the environment has a noticeable effect on the blood pressure especially in hypertensives. When measured at home many show readings of 40 millimeters of mercury or more, lower for systolic pressure.

During muscular effort systolic pressure is greatly increased. Diastolic pressure is decreased by moderate exercise and increased by severe exercise. Both systolic and diastolic pressures show a moderate rise following meals.

Menstruation and pregnancy do not have an appreciable effect on blood pressure. And, too, constipation seems to have no effect.

Alcohol, being a vasodilator, causes some fall in blood pressure which may be quite severe during deep intoxication. Tobacco has a variable effect raising pressure in some and lowering it in others. Even then the effect appears to be only a transient action.

Usually obesity is associated with a slightly elevated arterial pressure. The striking observation in the obese but otherwise normal persons is the higher mortality statistics. In contrast to the elevated pressure in the obese is the moderate fall of blood pressure in persons underweight but otherwise normal.

The effect of climate on blood pressure is open to discussion. It is known that in warm weather the blood pressure tends to fall but beyond that little is known.

It is wise to check blood pressure frequently as the age increases. Di-

astolic pressure should be observed sharply as it is here that the beginnings of true essential hypertension may be noted.

Page, I. H., and Corcoran, A. C.: *Arterial Hypertension*, Chicago, The Year Book Publishers, Inc., 1945, pages 13-19.



Basal Metabolism

Determination of heat production by the body can be made through direct calorimetry involving a complicated mechanism and laborious technique. It was discovered in the early use of the procedure that not only is a definite quantity of heat liberated by the burning of a gram of carbohydrate but that this combustion always involves the consumption of the same volume of oxygen.

For practical purposes this means that heat liberation can be measured indirectly simply by measuring the volume of oxygen used. When the normal mixture of foods is being burned, nearly five calories of heat are always produced for every liter of oxygen used.

In indirect calorimetry a device with a closed system containing a supply of oxygen is employed. The patient inspires from the device and expires into it. The carbon dioxide is removed from the expired air by passing it through a soda-lime bath. Then it is a simple matter to measure the amount of oxygen removed from the tank in a measured period of time. The rate of oxygen consumption as well as the heat production per hour or per day can be calculated.

In the normal individual three factors modify the rate of total heat production—physical exercise, exposure to cold, and ingestion of foods. With muscular exertion the rate of heat production increases and continues at a higher level for some time after the exercise ceases. Exposure to cold leads to a type of involuntary exercise. Eating food has a warming effect especially if the meal contains

proteins. This effect may last twelve to eighteen hours after protein ingestion.

The three variables can easily be controlled. A patient can fast for eighteen hours, refrain from exercise, and remain passive at rest for one-half hour and keep comfortably warm. Under these basal conditions all the heat generated by the individual is due to the activities of the internal organs and to the resting metabolism of the cells in general. This is termed the basal heat production or basal metabolism.

The basal metabolism, or B.M.R., is a constant, dependent on height, weight, age, and sex. From thousands of calculations tables have been established with which to compare individual readings. One has only to look under the proper age and sex to find the metabolic rate per square meter of body surface. Multiplying the patient's surface area (calculated from his height and weight) by this figure gives his normal metabolic rate. The result of the individual reading is expressed in a percentage of the normal, either plus or minus. A reading of over +15 per cent or lower than -15 per cent is considered pathologic.

The B.M.R. test is indispensable in abnormal thyroid gland function. It is also used in disorders causing fever and by the physician in learning more about the metabolism of the individual.

Carlson, A. J., and Johnson, Victor: *The Machinery of the Body*, Chicago, University of Chicago Press, 1947, pages 310-321.



Varicose Veins

Varicose veins may occur anywhere in the body but those given most attention are in the legs. Here they are usually seen on the inner side as soft swellings under the skin.

These veins are enlarged because the walls have lost a large part of their elasticity. There are few symptoms and only when complications

arise are varicose veins troublesome.

In the legs the venous mechanism consists of two systems providing a double pathway for the blood to return to the heart: The first, the femoral veins, lies deep within the leg; the second consists of two sets of veins. One group connects to form a smaller saphenous vein that joins with the femoral vein just behind the knee. The other set unites to form the greater saphenous vein which meets the femoral vein in the groin. Between the two systems there are communicating veins.

As a rule the superficial veins return only a small portion of the total amount of blood flowing into the legs. However, they are able to carry the major portion of the blood if the femoral system becomes blocked.

There are two types of varicose veins. When the superficial veins are prominent because of carrying the major portion of the blood to the heart, they are classed as varicose veins of the secondary type. The primary type occurs when the internal system is intact and the fault lies within the veins. This is by far the most frequent type.

Many causes for the saphenous veins becoming enlarged are noted. There is evidence that a tendency to develop varicose veins is inherited. Aging causes a loss of resiliency. Because of their location they are not as well protected against a sudden or prolonged increase of pressure within the vein; also, pressure in the veins is increased by straining, occupational stresses, and obstruction to the flow of blood.

The greater saphenous vein and its tributaries are most frequently involved in the development of varicosities. People whose work requires them to stand for long periods are prone to suffer from this disorder.

As the disorder progresses complications arise. Vague aches and pains develop in the leg. In the areas served by these veins an edema occurs. This results in malnutrition of the skin with a final breaking down and ulcer formation. These ulcers are difficult to treat and require prolonged treatment.

Treatment must be based on a thor-

ough physical examination. There is no method of restoring varicose veins to normal. Therefore, treatment is directed toward removal of factors causing varicosities and to eradication of the varicose veins.

Small veins are often treated with injections and elastic bandaging. Surgery is indicated when the saphenous vein is affected.

The dentist is particularly interested in varicose veins because of the long hours of standing demanded by work at the chair. This may be a definite factor in causing the disorder. Frequent examination, exercise, and sitting while working will help to avert trouble.

Melkon, E. A., and Scheidell, D. K.: *Injection Treatment of Varicose Veins*, *New England J. Med.* 236:940-942 (June 19) 1947. Bechman, Harry: *Treatment in General Practice*, Philadelphia, W. B. Saunders Company, 1943, pages 677-683.



Significance of Hoarseness

The dentist is in a position to be of valuable service to his patients in the recognition and early treatment of many disorders. He sees his patients regularly over a period of time. By being alert to any distinct change in the voice or to the presence of hoarseness, he may initiate the first step in the recognition and early treatment of potentially dangerous disorders.

Hoarseness is normally associated with the larynx. It has been shown that carcinoma of the larynx is successfully treated in well over 80 per cent of cases if detected early. One of the symptoms of carcinoma of the larynx is hoarseness. Delay in diagnosis makes the prognosis hopeless.

There are many causes of hoarseness. The conditions found in the larynx itself are malignant and benign neoplasms, acute and chronic inflammatory and granulomatous tissue, syphilis, tuberculosis, vocal nodules, keratosis, and injuries.

Often the hoarseness results from

conditions not of laryngeal origin. These include aneurysm of the arch of the aorta, carcinoma of the trachea or a bronchus, carcinoma of the esophagus, metastasis from neoplasms of distant origin, pulmonary tuberculosis, thickened pleura, carcinoma of the thyroid gland, cardiac disorders, blood dyscrasias, allergy and diseases of the nervous system.

Thus it is readily seen that the many causes of hoarseness are in reality a general problem. The hoarseness may be the first symptom to direct attention to the patient's disability.

Chronic hoarseness is not a clinical entity but merely a symptom which should direct attention to the larynx. Chronic laryngitis does exist but a diagnosis of it is permissible only after other conditions have been eliminated as causative factors.

Carcinoma of the larynx involves the anterior one-half of a vocal cord in about 70 per cent of cases. Such a lesion will interfere with the proper approximation of the vocal cords in the earlier stages. These lesions grow slowly so that early diagnosis with treatment is successful in at least 80 per cent of individuals.

Tuberculosis may occur in the posterior part of the larynx. The lesion is secondary to bronchopulmonary tuberculosis.

Usually, when a laryngeal lesion is detected, a biopsy of the suspected area is made to rule out carcinoma. The chest x-ray and sputum tests will reveal any tuberculosis and serologic tests of the blood, syphilis. Beyond these, further differential examination is necessary.

Clerf, L. H.: *Clinical Significance of Hoarseness*, *Am. Practitioner* 1:28-30 (September) 1946.



Minimal Tuberculosis

The widespread increase in x-ray service in this country has made the problem of minimal tuberculosis one of utmost importance. Because of the extensive use of hospital insurance, excellent economic conditions, and

educational programs both in the service and among civilian population, countless numbers of persons are submitting to routine chest x-rays.

Of a group of 170,000 persons x-rayed by the Michigan Department of Health, it was found that a percentage of 1.48 showed areas suggesting tuberculosis. Only a small percentage of those with suspicious areas had lesions demanding hospitalization. However, it was necessary to examine thoroughly the 1.48 per cent to determine the exact status of lesions.

Often patients with minimal tuberculosis show no symptoms. The cardinal symptoms are: unusual fatigue, weight loss, blood spitting, fever, cough, and loss of appetite. The history of past illnesses and contacts is important in dealing with minimal tuberculosis.

It is suggested that these suspects submit to four or five single sputum examinations of direct smear. If these are negative, a specimen obtained by gastric aspiration from a fasting stomach should be processed by both culture and guinea pig inoculation.

The culture test is carried out by inoculating tubes of culture, sealing them with paraffin, and incubating for six weeks at 37°. All tubes are inspected once a week for the first two weeks after inoculation. Cultures showing no macroscopic growths after six weeks are regarded as negative.

The Mantoux test should be done as a matter of routine procedure. And it is important that these persons maintain clinical contact if the situation and the roentgenographic evidence warrants this precaution.

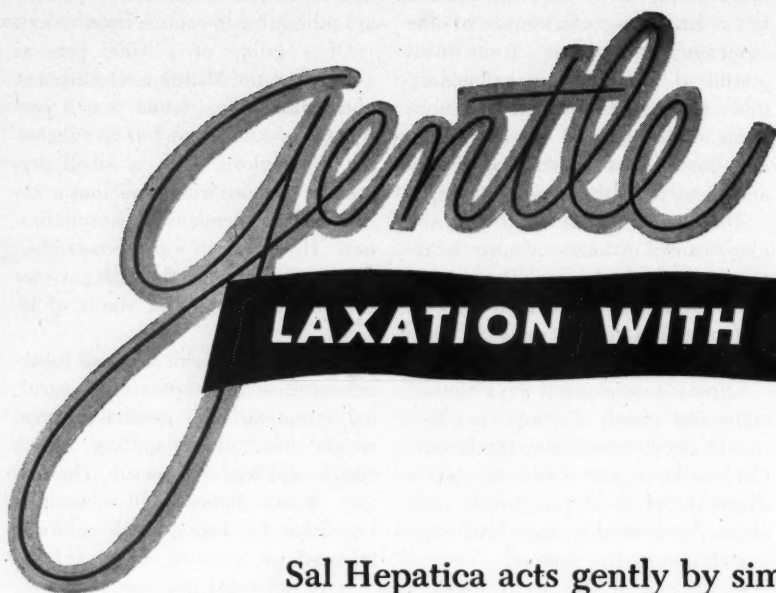
Towey, J. W.: *Minimal Tuberculosis*, *J. Michigan M. Soc.* 46:668-669 (June) 1947.



Tests—Bleeding Time and Coagulation Time

Clinical preoperative procedure in the hospital includes the checking of the bleeding time and the coagulation time of the blood.

(Continued on page 507)



LAXATION WITH FLUID BULK

Sal Hepatica acts gently by simple osmosis, increasing the liquid content of the bowel and diluting fecal residue. Soft fluid pressure evokes peristalsis and evacuation by normal physiologic means.

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Sal Hepatica

Product of BRISTOL-MYERS

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(Continued from page 505)

Bleeding time is checked by making enough of a stab wound in the lobe of the ear to allow several drops of blood to flow spontaneously. At one-half minute intervals the blood is blotted with absorbent paper. The size of the clot gradually decreases. When the bleeding has ceased, the time required for the process is noted.

Normally, the bleeding time is three to seven minutes. A prolonged bleeding time may be indicative of severe anemia, purpura haemorrhagica, certain disturbances of the liver, or other less frequent disorders. The bleeding time checked by this method is not prolonged in hemophilia.

Coagulation of the blood consists mainly in the transformation of fibrinogen into fibrin by means of a ferment called thrombin. The resulting clot is made up of a meshwork of fibrin with the entangled, formed elements of the blood.

There are several methods by which to determine coagulation time. The simplest is to place several drops of blood on a clean slide. This blood should be obtained from a vein puncture without trauma or contamination. At one-half minute intervals a pinpoint or needle is drawn through the drops. When streaks of fibrin cling to the needle, coagulation has taken place. Normally, coagulation time is two to four minutes.

Clinically, a shortening of the coagulation time is not of much importance. However, an increase in coagulation time is important, especially in hemophilia. An increase is noted in obstructive jaundice, some anemias, leukemia, and some infectious diseases as pneumonia.

Levinson, S. A., and MacFate, R. P.: *Clinical Laboratory Diagnosis*, Philadelphia, Lea & Febiger, 1935, pages 383-385.



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CLINICAL AND LABORATORY SUGGESTIONS

(See pages 500 and 501)

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Snooping in the Grocery Store

In my grandmother's day, any woman who didn't bake her own bread was a woman scorned. If a housewife didn't "put up" her own vegetables and fruit for the long winter, she was considered a wastrel.

Our grandmothers never heard of vitamins, of hyperglycemia, or of hypoproteinemia. They loaded their tables with quantities of food, much of which was entirely lacking in nutritive value: Three kinds of cake and a couple of kinds of pie were common offerings at farm dinners. I don't remember that oranges ever

appeared except as delicacies at the Christmas season. I am not sure where we received our ascorbic acid in the seasons after the fresh fruits were gone. How much ascorbic acid was retained in preserved fruits and vegetables is something that the biochemists may answer.

The "groaning table" was a symbol of the good provider and of the dutiful housekeeper. The fact that it was loaded with fried meats, overcooked vegetables, and many varieties of starches did not concern anyone. Set-

ting a "good table" meant lots of things on it—quantity and infinite variety.

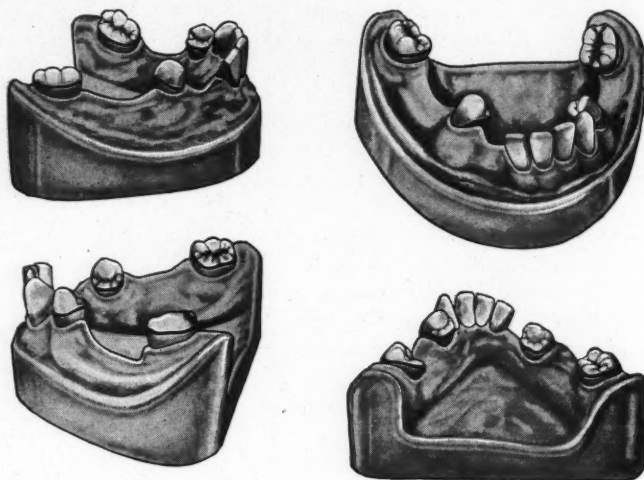
With all our present knowledge of nutrition, I doubt if we are much better off than people were in grandmother's day. Candy, soft drinks, sweet stuffs, are available almost everywhere at counters and in dispensing machines. The protective proteins, with good beef near a dollar a pound, are too costly. We are informed that the price of eggs, because of the grain scarcity, is going up. Our

* GOLD DOES THE "IMPOSSIBLE"

This is one of those rare instances in which one malpositioned tooth almost brought about the extraction of all the remaining teeth in the arch. The second bicuspid is tilted lingually about 45° more than normal and on any ordinary analysis it seems to block effectively any attempt to seat a partial denture. Complete extraction was, in fact, recommended to the patient.

Careful analysis on the Ney Surveyor showed, however, that the badly tilted bicuspid was not an unsurmountable obstacle, in fact was not the most difficult problem, and that a gold partial could be designed which would go to place and would have all the necessary elements of bracing, retention and support. The case was completed in NEY-ORO G-3 and has given comfortable, efficient service for more than two years. Thus, eight strong natural teeth were saved from premature loss to the great pleasure and satisfaction of dentist and patient.

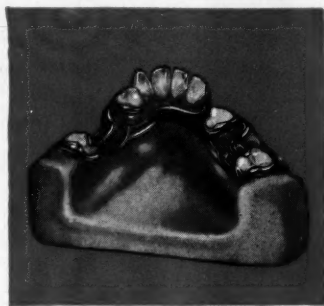
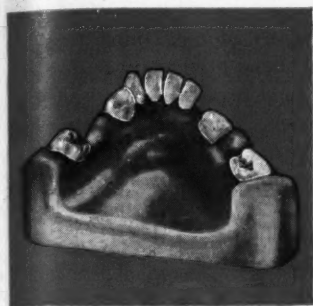
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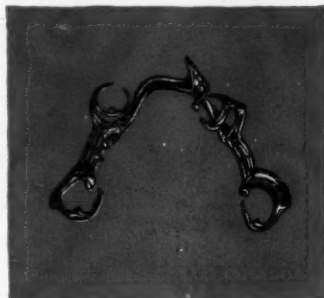
* Number Twenty of a Series

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This young man had ignored dentistry until he was well over 20 years old. Carious teeth were extracted from time to time but no restoration attempted. The remaining teeth were left to drift unchecked,—with serious consequences.

The strut which runs from the gold framework to the right lateral defines an unusual space between lateral and supplied tooth. Surveyor analysis definitely pointed out that the case could be seated only if it were deliberately designed to create such a space. In fact, this was the key to the whole problem.



The final design included ring clasps on the two molars and back-action clasps on both bicuspid with buccal truss arms instead of the more usual lingual truss arms. The very difficult undercut conditions called for a material with flexibility as well as strength and, therefore, NEY-ORO G-3 Casting Gold was a wise and successful choice.

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We are bombarded with propaganda and false advice by food purveyors and manipulators. We buy our food with an ear to the slogan and an

eye to fancy advertising copy. And we should not forget that some of the most powerful monopolies and most adroit propagandists are engaged in the manufacture and distribution of food.

Most of our women do their own shopping. They push their cart and wire baskets around the grocery store and choose their foods, most of them not too wisely. Recently I did a snooping in a grocery by standing near the cashier's counter and looking into the baskets of foodstuffs that women

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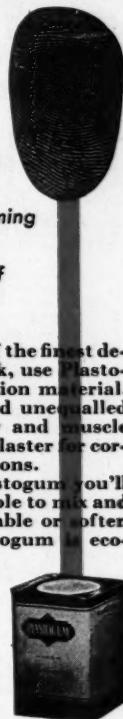
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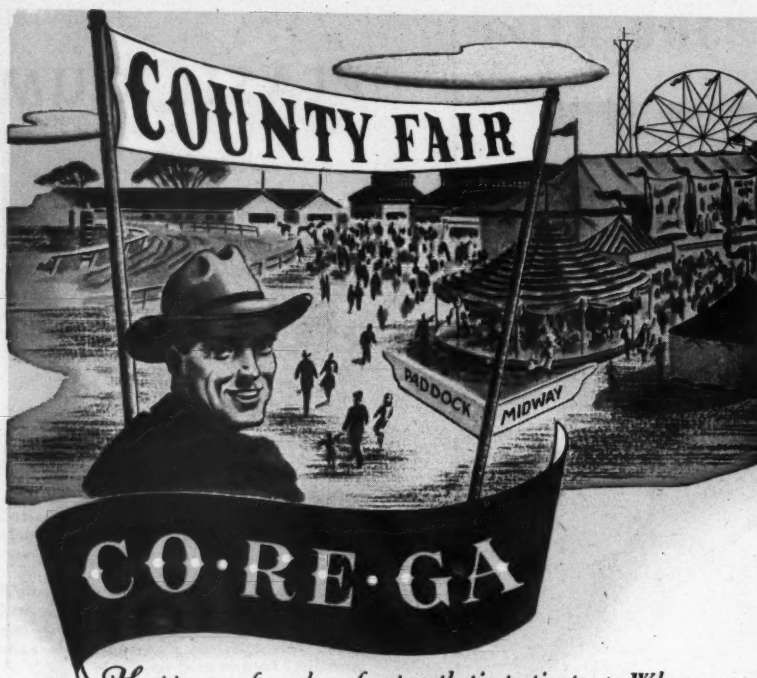


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brought to be checked. The amount of starch and sugar foods was appalling: macaroni, white bread, spaghetti, cakes, cereals of all kinds, jams and jellies, crackers and cookies, potatoes. The lack of green vegetables and fresh fruits was distressing.

This "survey" of mine was made in a farming community in summertime so perhaps some of the women were getting greens and fruits from their own gardens and orchards. The same explanation may be given for the scarcity of eggs and butter in the market baskets that I saw, although, from what I know of my country neighbors, few of them keep laying hens or churn their own butter. The farmer is also a specialist! Only a few are general practitioners of farming with grains and stock, with chickens and gardens and orchards. Gone are the days when the farmer is self-supporting. He, too, buys much of his food in bags, cans, and cartons. As he becomes more affluent, he becomes less independent. So it is with all of us.

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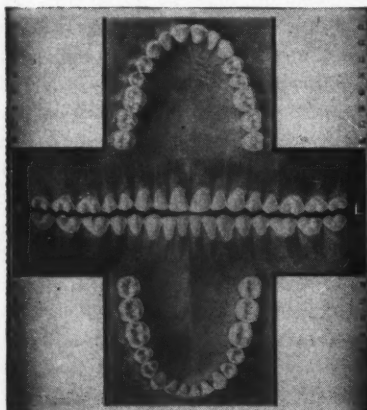
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to do in an educational program before the housewives of America. Someone, someday, is going to have the enterprising foresight to paint big signs in grocery stores, telling the women who come to shop what the daily basic food requirements are in terms of proteins, fats, minerals, and vitamins. They will tell these women in what foodstuffs these essential elements are found and in what amounts. They will be educated in this way at the very moment they are buying their groceries. I can envision an entire wall of a store taken over with basic nutrition information prepared and illustrated in the simplest kind of terms.

Even the women who have some knowledge of nutrition are apt to forget what they know when they are shopping. What they heard over the radio for the most part was a sales talk for a special product that might or might not have any value. The kind of nutritional education carried on in a grocery store should not be "commercial." If it advertised any particular brand of anything, it would be a failure.

It is doubtful whether the grocery people, geared like most of us to their own little selfish worlds, can have the foresight and the vision to present the fundamentals of nutrition simply and directly to the consumers. I have the feeling that *everyone* would profit from this kind of program.

Personal Item

The many friends and admirers of Mr. James Robinson will be happy to know that he has become the Executive Secretary of the Southern California Dental Association. Jim Robinson has been speaking clearly and well for years, showing dentists their opportunities in practice and the breadth of their potential field of usefulness. In his new position as an executive of a dental society, Jim will be able to inspire many dentists to greater things.

The Southern California Dental Association is to be commended for selecting a man of this high type to direct its affairs and to act as a liaison with the public and with other health agencies.

More Emphasis on People

The medical literature, nearly always more vigorous and in advance of the dental literature, carries an increasing number of articles on functional diseases and psychosomatic medicine. Dentists, if they are to fulfill their professional obligations, should strive to keep abreast of medical advancement and to integrate the developments in medical science with their own dental problems.

The principles of disease are applicable to all tissues. Only the treatment of disease varies in method. The dentist and the surgeon use mechanical procedures; the internist chemotherapy; the radiologist applies the laws of physics; the psychiatrist probes the recesses and hidden places in the human personality. All specialists have their dealings with people and with tissues. Whether a disease is labeled organic or functional, somatic or psychic, the fact is that a *person* is involved. The clinician should comprehend the basic laws of life that apply to all people and then evaluate each disease in terms of the patient's individuality and uniqueness.

In two recent articles¹ in the *Journal of the American Medical Association*, two outstanding physicians, Joseph T. Wearn and Edward A. Strecker, of Western Reserve University and the University of Pennsylvania respectively, presented a convincing case for the revamping of the medical curriculum with a stronger emphasis on the human personality in health and disease. If the physician should know more about the persons that he treats, the same is true for the dentist. If the medical course of study is to be revised with a greater emphasis on psychobiology with relation to physical problems, the same kind of change should come to the dental curriculum.

A little less science in the dental curriculum and a little more emphasis on the art of human relationships and understanding might make better dentists. Although most dental disease is

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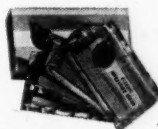


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¹Wearn, J. T.: The Challenge of Functional Disease, *J.A.M.A.* 134:1517-1520 (August 30) 1947. Strecker, E. A.: Psychosomatics, *ibid.* 134:1520-1521 (August 30) 1947.



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organic, objective, and demonstrable by physical methods, the origins and effects of dental disease may be deeply buried within the human personality. Dental educators, in planning their future courses of instruction, should consider these words of two eminent educators.

Doctor Wearn says: "The practitioner in all fields of medicine is confronted today with a major challenge, which is the recognition and proper handling of patients with functional disease. It is a challenge that he can and must meet, but in order to do so he must equip himself with additional knowledge of some of the precepts and techniques of psychiatric practice. Even though new knowledge and techniques in this field are acquired by practitioners in all departments of medicine, the challenge still stands, for the members of the profession must apply to this urgent problem of functional disease all the investigative and research skills which in the past fifty years have produced such epochal advances in the knowledge of organic disease. Only

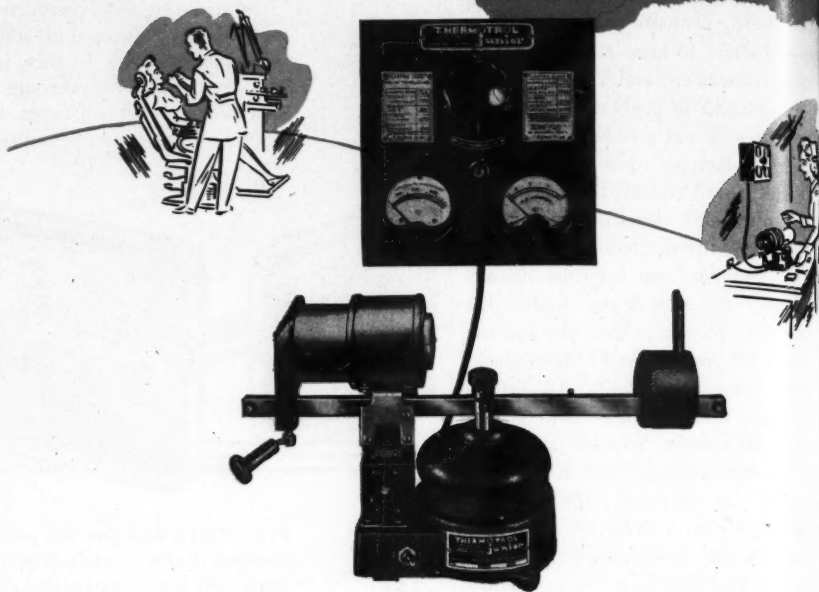
by a concentrated effort of medical schools, general practitioners, psychiatrists and specialists in the pre-clinical sciences, can the members of the medical profession successfully cope with the problems created by functional disorders which will soon be, if they are not already, the greatest single cause of the symptoms which bring patients to a physician's office."

On the liaison between general medicine and psychiatry, Doctor Strecker writes: "Any one who wishes to prac-

tice psychosomatic medicine must have a workable concept of the structure of the human personality and the not conscious mind—a mind containing significant repressed material not accessible to everyday conscious awareness; of the hidden conflict between irreconcilable demands of the personality and of the many techniques and mechanisms of defense which operate to produce the pathologic compromise, often presenting to the physician as functional psychosomatic illness. It must be realized that

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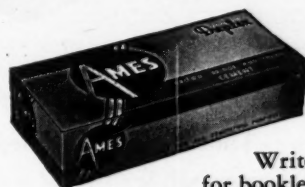
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these psychopathologic disease—evolving steps are as concrete as are the stages, let us say, between the chance of syphilis and syphilitic aortitis. Furthermore, it must be realized that there is no universality of psychopathology. Neither is there in organic pathology. For instance, given infection by the bacillus of Koch, the particular body constitution becomes a factor in shaping the varying result—tuberculosis, acute or chronic, which may involve any organ or tissue of the body. So too are the particular

markings of the personality influential in molding psychosomatic symptoms and helping to fix their location—cardiocirculatory, gastrointestinal, genitourinary or dermagenic. Each human personality, striving unconsciously to avert the catastrophe of psychic disorganization, utilizes the psychologic weapons which are the more natural and trustworthy for that particular personality.

"... In anatomy there are livers, hearts and spleens. So too is there an anatomy of psychology to be studied,

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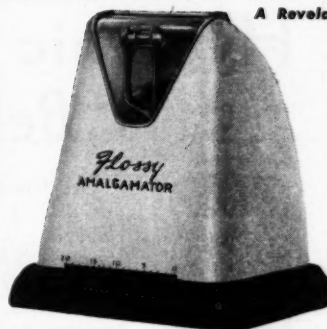
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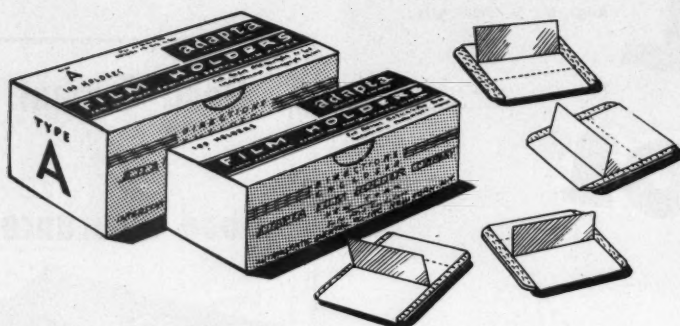
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consisting of normal emotions, consciousness, memory and the like. There is a physiology which teaches how organs work. So too should there be taught a physiology of how mental functions work. Paralleling histology, the microscopic study of normal organs and tissues, the student should be made familiar with the finer divisions of mental functioning; for instance, remote and recent memory, the gradations of normal consciousness, the variety of emotional shadings and their somatic profiles. When the Department of Pathology is demonstrating gross morbid lesions, syphilitic aortitis, liver abscess and what not, the Department of Psychiatry should be demonstrating the gross pathology of the mind, pronounced emotional deviations such as profound melancholia or rage and fear with their component bodily expressions. Likewise should there be dual teaching of microscopic pathology: on the one hand, let us say, the study of a cross section of an arteriosclerotic vessel or the walls of an abscess, on the other a span of amnesia or the psychosomatics of anxiety due to repressed emotional conflicts."

Neither of these writers proposes that the science of medicine be discarded. They are suggesting that the cold science be augmented by deeper studies of the human personality and the role of emotions as causes and results of disease be considered along with the scientific tests and measurements. A wedding of the art and the science of medicine and dentistry is advised.—E. J. R.

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¹Faucett, R. E.; Thomas, M. P.; and Ruddock, J. C., California Med. 65:218-224 (November) 1946.

cious film in the oral pharynx for some time.

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—From *What's New*, No. 113:221 (April) 1947.

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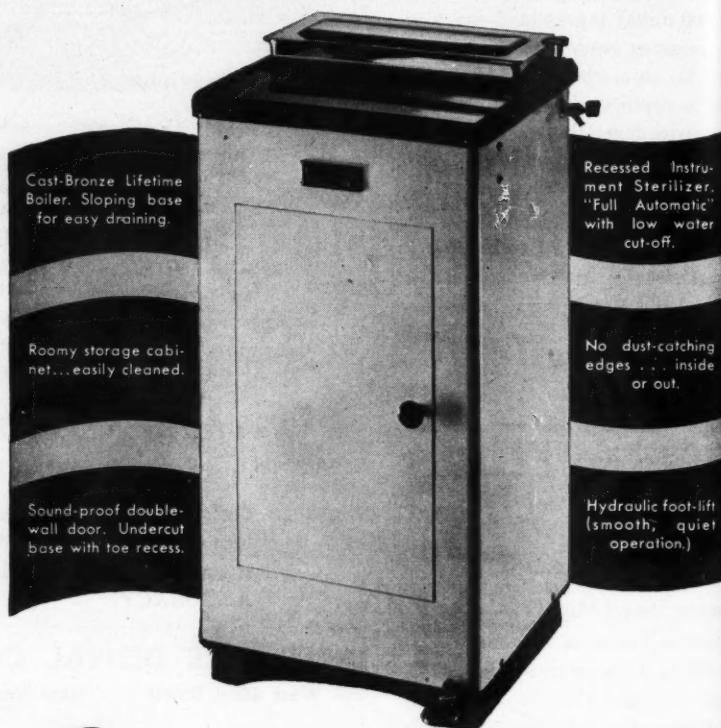
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